A STUDY OF THE RELATIONSHIPS OF SELF-EFFICACY OF SELF-MANAGEMENT OF ASTHMA AND ASTHMA SELF-MANAGEMENT KNOWLEDGE

A Dissertation

by

LAURA STEED MCCORKLE

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

August 2005

Major Subject: Educational Psychology

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ABSTRACT

A Study of the Relationships of Self-Efficacy of Self-Management of Asthma and Asthma Self-Management Knowledge.

(August 2005)

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The purposes of this study are to examine the relationship of self-efficacy regarding self-management of asthma and student self-management knowledge and also examine the extent to which self-efficacy and self-management knowledge predicts student outcomes such as reading grades, the number of times a student was absent and the number of visits a student made to the school nurse. Students were sampled from one public school district within a suburban city in the southwest portion of the United States. The sample was comprised of 33 males and 12 females ranging in age from six to eleven years of age.

Three data collection instruments were developed for this study. Parents of the participants were asked to fill out a demographic survey to provide descriptive data. Participants of the study were administered two face-to-face interview surveys: The Asthma Student Self-Management Knowledge in a School Setting Survey (SMS) and the

Asthma Self-Efficacy of Self-Management of Asthma Survey (AMES). Both surveys were developed based on the six lesson topics of Open Airways.

Two separate data analyses were conducted based on the data collected from each participant. To better understand the relationship between the AMES and the SMS, a Pearson Product Moment Correlation Coefficient was used in the regression analysis. The findings showed that there was a statistically significant positive relationship between the SMS and the AMES. To determine if the AMES and the SMS could predict reading grades, the number of times a student was absent and the number of visits a student made to the school nurse, a multiple linear regression was used. The findings showed that there is minimal evidence showing that only reading scores maybe predicted by asthma self-efficacy and asthma self-management knowledge.

Taking into account identified limitations such as not taking into account the severity of the participant's asthma, one would be cautious to generalize these findings to other children with asthma. Based on these results and limitations, recommendations for future practice and for future research are provided.

DEDICATION

I would like to dedicate this to my family and to my friends who stuck with me throughout this entire process, I know… it's about time. I would also like to dedicate this to my husband for believing in me, supporting me, and for pushing me to be the very best that I can be. I will miss hearing you say, "Get in there and work on that paper." I did it...Cheers!

ACKNOWLEDGEMENTS

I would like to acknowledge all the people who provided guidance, support, and assistance throughout this painful process. To Dr. Doug Palmer, I would like to say thank you for your continued patience as you guided me through this dissertation process. Thanks for keeping me focused on the big picture and not sweating the small stuff. I would also like to thank Dr. Linda Parrish for her constructive feedback regarding my dissertation drafts. You certainly had a way of making me feel "good". To Dr. Linda Skrla and Dr. Janine Edwards I would like to thank you for your feedback and support. Thanks for hanging in there with me. I am also appreciative to Dr. Debra Nelson for seeing the importance of this study and for helping to champion this effort throughout its course. I would especially like to thank Leslie Odom for her patience, her understanding, and her excellent teaching skills. I am eternally grateful and I could not have done this without you. Thank you from the bottom of my heart!

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CHAPTER I

INTRODUCTION

Background

Asthma, a disease of the lungs, is the most common chronic illness among children. According to the American Lung Association (2004), 9 million children (12%) in the United States, under the age of 18, experience asthma. Besides the medical problems, children with asthma are confronted by a high absentee rate, poor academic performance, reduced participation in school activities, feelings of inadequacy, helplessness and depression (Freudenberg, Feldman, Clark, Millman, Valle, & Wasilewski, 1980; Lynch, Lewis, & Murphy, 1992; MacLean, Perrin, Gortmaker, & Pierre, 1992; Theis, 1999).

Education about asthma typically begins in the physician's office. This education is usually directed at the parents more than the child and consists of a brief review of asthma and the medication prescribed for its management (Evans, Clark, Levison, Levin, & Mellins, 2001; Hannaway, 2002; Richards, Church, Roberts, Newman, & Garon, 1981). For children with mild asthma this type of education is sufficient; however, children with more severe asthma need a more in depth self-management program (Wigal, Creer, Kotses, & Lewis, 1990). Because chronic diseases are unpredictable and may fluctuate even on a day-to-day basis, the disease must be managed on a daily basis (Holman and Lorig, 1992). Self-management programs for children with asthma in general have four common goals: (1) to prevent and control asthma, (2) to reduce

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financial costs incurred for asthma, (3) to reduce the impact of asthma on the children and their families, and (4) to teach children, through cooperation with their physicians, to shoulder greater responsibility for the management of their asthma (Wigal et al. 1990). Children who participate in such programs have an increase in attendance and achievement in school (Evans, Clark, & Feldman, 1987a), learn more about their asthma and feel better about their capability to manage their own symptoms (Persaud, Barnett, Weller, Baldwin, Niebuhr, & McCormick, 1996).

As a result of studies showing that few parents could attend program sessions during the school day (Evans, Clark, Levison, Levin, & Mellins, 2001), the focus of asthma management teaching shifted from the primary caregiver to the child. Two programs, "Teaching My Parent/Myself about Asthma" and "Open Airways," were developed, to address the children and the management of their asthma within a school setting. Parcel and Nader (1977) developed the first school-based asthma management program, "Teaching Myself about Asthma". The program's focus is for children ages' kindergarten through fifth grade and is delivered in twenty-four weekly sessions by a team of classroom teachers, resource teachers, school psychologists, and nurses. Parcel and Nader conducted the first pilot study with 13 elementary school children. However, due to poor parental attendance and lack of significant changes in medical outcomes, an educational book was added, "Teaching My Parent/Myself about Asthma" (Parcel, Nader, & Tierman, 1980). A follow-up study was conducted with children who participated in the program and the results showed an increase in knowledge about asthma and a greater feeling of control over their asthma (Parcel et al. 1980). No data on school attendance or performance was reported.

The second asthma management program developed for a school setting was Open Airways (Evans, Clark, Feldman, Rips, Kaplan, Levison, et al., 1987b). The original Open Airways program was developed and evaluated at Columbia University (Evans, Clark, & Feldman, 1987a) and funded by the National Heart, Lung, and Blood Institute as a clinic-based asthma education program. The program, adapted by the originators for use in 12 New York City elementary schools, studied African American and Hispanic children from low-income communities with limited access to health care services and children whose asthma had gone undetected and therefore untreated. The children who completed the program showed an increase in the number of actions they took to manage their asthma, an increase in school performance, an increase in feelings of self-efficacy, and fewer and shorter episodes of asthma attacks (Evans, Clark, Feldman, Rips, Kaplan, Levison, et al., 1987b). In light of studies that have demonstrated effectiveness of the Open Airways program, the American Lung Association has adopted this program for the self-management of asthma for children. (Evans, Clark, Feldman, 1987a; Evans, Clark, Feldman, Rips, Kaplan, Levison, et al., 1987b; Feldman, 1987; Horner, 1998; Kaplan, Rips, Clark, Evans, Wasilewski, & Feldman, 1986; Rachelefsky, 1987; Wigal, Creer, Kotses, & Lewis, 1990).

Despite the evidence of importance and availability of asthma self-management programs like “Open Airways for Schools”, few students engage in self-management behaviors. Bandura (1997) argues that availability of information regarding a new behavior is not sufficient for the adoption of a new behavior. The probability that a person will perform a behavior is related to the person’s beliefs that he or she has the knowledge and ability to perform the behavior and that the behavior will result in a

beneficial outcome (Bandura, 1997). These beliefs are termed self-efficacy. Self-efficacy is what you believe you can do, with the skills you have, under different circumstances (Bandura, 1997). Self-efficacy determines if one will initiate the behavior change, the effort expended, and persistence over obstacles (Bandura, 1977). People who have strong self-efficacy will persevere over obstacles and are more likely to be successful in other situations (Bandura, 1997) such as better attendance and higher achievement.

Statement of the Problem

There is a growing body of evidence to support the usage of self-efficacy to predict sustaining behavior change across a range of medical problems, including AIDS preventive behaviors (Kasen, Vaughan, & Walter, 1992), prediction of adherence and control of diabetes (Kavanagh, Gooley, & Wilson, 1993), management of chronic arthritis (Holman and Lorig, 1992), and adaption to rheumatoid arthritis (Schiaffino & Revenson, 1992). However, to date, there have only been three research studies that examined the relationship of asthma self-management knowledge and asthma self-efficacy. One of the studies was administered to adults (Tobin, Wigal, Winder, Holroyd, & Creer, 1987) while the other two were administered to children (Schlosser & Havermans, 1992). However, there has not been a study that examined the relationship of asthma self-management knowledge and asthma self-efficacy to school-related outcomes.

Purposes of the Study

The purposes of this study are to examine the relationship of self-efficacy regarding self-management of asthma and student self-management knowledge and also examine the extent to which self-efficacy and self-management knowledge predicts student outcomes.

Research Questions

The following research questions were investigated as part of this study:

1. Is self-efficacy of self-management of asthma related to student self-management knowledge of asthma in a school setting?
2. Does self-efficacy of asthma self-management and asthma self-management knowledge predict grades for reading, school attendance, and the number of visits to the school nurse?

Definitions

For the purposes of this study, the following terms were operationally defined as follows:

1. Absentee Rate-

   Number of days a child is absent from school divided by the total possible number of days. For the purpose of this paper, the number of days is a nine-week period that consists of 44 days. The first collection was collected from October 14 to December 20, 2002 with a school holiday for Columbus Day and one week off for Thanksgiving. The second collection was collected from October 13 to December 19, 2003 with a school holiday for Columbus Day and one week off for Thanksgiving.

2. Asthma-

   Asthma is believed to be an inherited chronic lung disease (Blessing-Moore, Fritz, & Lewiston, 1985) that is characterized by wheezing, a high-pitched whistling sound, which is produced when the airway in the lung go into a spasm and narrows (Schmitt, 1999).

3. Peak Flow Meter-

   A Peak Flow Meter is a portable hand-held device used to measure your ability to push air out of your lungs (Asthma and Allergy Foundation of America, 1999a).

4. Self-Efficacy-

   What you believe you can do, with the skills you have, under different circumstances (Bandura, 1997). Self-efficacy determines if one will initiate the behavior change, the effort expended, and persistence over obstacles (Bandura, 1977).

5. Self-Management-

   One's active and effective involvement in one's self-care of his/her condition (McNabb, Wilson-Pessno, Hughes, & Scamagas, 1985).

6. Severity-

   Using short-term medications more often than every four hours is an indication of increasing asthma severity (Hannaway, 2002).

CHAPTER II

REVIEW OF THE LITERATURE

As the number of school children with asthma continues to rise, the importance of asthma self-management becomes an essential component of asthma education. An asthma self-management program consists of several components relating to asthma medical treatment, asthma prevention, and asthma maintenance. Although children's self-efficacy pertaining to asthma self-management may play an important role in the effective management of asthma, little is known in this area. The nature and etiology of asthma, asthma self-management programs and asthma management self-efficacy will be discussed.

Nature and Etiology of Asthma

The exact cause of asthma is not known (National Heart, Lung, and Blood Institute, 1997). Asthma is believed to be an inherited chronic lung disease (Blessing-Moore, Fritz, &Lewiston, 1985) that is characterized by wheezing, a high-pitched whistling sound, which is produced when the airways in the lungs go into a spasm and narrows (Schmitt, 1999). The narrowing of the lungs is a result of the lungs producing excess amounts of mucus and causing mucosal swelling within the lungs (Lenfant & Khaltaev, 1995). In addition to wheezing, children often complain of chest tightness, difficulty breathing and coughing (Schmitt, 1999). Left untreated, inflammation may lead to irreversible changes in lung structure, called remodeling. (Hannaway, 2002). In extreme cases where there is airway obstruction unconsciousness, neuropsychological impairment or death may occur (Rietveld & Colland, 1999).

Asthma is the most common chronic illness among children. According to the American Lung Association (2004), nine million children under the age of eighteen, experience asthma. Unlike other chronic childhood diseases asthma is a condition that often requires immediate attention (Getch & Neuharth-Pritchett, 1999). One-third of children who develop asthma do so before their third birthday, and nearly 80 percent of all asthmatic children start to wheeze before they enter the first grade (Hannaway, 2002). While some young children will outgrow their asthma in mid to late childhood, the condition remains very common among teenagers (Mellis, 1994). Asthma is more prevalent in industrialized urban settings, colder climates and among the urban disadvantaged (Hannaway, 2002; Gershwin, 1997). It affects the African-American and Hispanic cultures 38 % more than the Caucasian culture (American Lung Association, 2004). In 1980, 3.6% of children had asthma. By 1995 the prevalence had increased to 7.5% (Center for Disease Control and Prevention, 2001). As the asthma rates continue to rise, so too does the awareness of the effects that asthma is having on children.

Effects of Childhood Asthma

Children with asthma are confronted not only by medical problems, but also by a high absentee rate from school, poor academic performance, and negative feelings such as inadequacy, helplessness, and depression (Freudenberg, Feldman, Clark, Millman, Valle, & Wasilewski, 1980; Hannaway, 2002; Lynch, Lewis & Murphy, 1992; MacLean, Perrin, Gortmaker, & Pierre, 1992; Theis, 1999), each of which will be discussed in detail below.

Absentee Rates

Children absent from school due to asthma are usually absent more frequently, but only for a brief period of time, which can be more harmful academically then the occasional long absence (Richards, 1986). Being absent from school will not only affect academic performance, but may also affect social and leisure pursuits, behavior and the general aspects of daily life (Bener, Abdulrazzaq, Debuse, & Abdin, 1994).

Parcel, Gilman, Nader and Bunce (1979) studied school absentee rates for elementary school aged (K-5) children with asthma compared to those without asthma from one school district in Galveston, Texas. Asthmatic children who were already enrolled in an asthma educational program (n = 95) were used in the study. The general population, those without asthma were taken from a random sample (n = 711). Through questionnaires and personal interviews, independent variables such as sex, ethnicity, social economic status (SES), grade, and mother's perception of severity of asthma were collected. The dependent variable, attendance, was collected from an accumulation of attendance records for the year.

Attendance rates were calculated by dividing the number of days absent by the number of days enrolled in school for one year. Student t-tests were performed to compare absentee rates for children with asthma to those without asthma. All children with asthma missed at least one day. They also had a significantly higher absentee rate (8.4%) compared to the non-asthmatic children (5.9%) ($P < .001$). This difference was true regardless of ethnicity, gender, and for the most part, SES. Children in the lower grades had higher absentee rates compared to children in the higher grades. Mean absentee rates for children differed when compared to their mother's perception of the

severity of their child's asthma. Mothers rated their child's asthma as mild (6.9%), moderate (7.9%), or severe (13.9%). The investigators placed the demographic variables (gender, SES, grade, and ethnicity) and mother's perception into a stepwise regression analysis, with the total percentage of days absent as the dependent variable. The mother's perception was the only variable that showed a significant correlation with days absent.

Freudenberg, Feldman, Clark, Millman, Valle, and Wasilewski (1980) attempted to define some of the school problems encountered by children with asthma. The Asthma Self-Management Project, a four-year study conducted at Columbia University, was developed to reduce asthma emergency room visits and inpatient hospital utilization while increasing school attendance and improving social functioning of asthmatic participants. To accomplish these objectives the program was divided into three phases; instrument development, educational sessions and evaluation of the impact of the intervention.

Criteria for enrollment in the project included children aged 4-16 years; attendance in a pediatric allergy clinic at one of the New York City hospitals; a diagnosis of asthma; and at least one episode of wheezing reported by physician. All families who fulfilled these criteria were invited to participate in the project. Participants (parents and children) were asked a series of questions relating to school attendance and performance. Data from the first 200 hundred families showed that the mean age of the enrolled children was 10 years old. Nearly 60% of the children were male and 40% were female. Most of the families' maintained lower socioeconomic status with nearly 60% received Public Assistance or Medicaid.

Parents in phase one of the study reported that their children missed an average of three days a month from school with nearly 20% missing six or more days a month. To obtain accuracy the investigators randomly chose 50 children to review their school records. School absences, for those 50 children, were then compared with the average overall absence rate for that district. The overall school absence rate was 21 days per year compared with the children with asthma average absentee rate of 26 days per year. Parents reported that these absences were both long and frequent.

In Clark, Feldman, Evans, Wasilewski, and Levison (1984) 274 participants were randomly selected from patients who attended four pediatric allergy clinics in New York City. Six educational sessions were provided to parents and children based on baseline survey data gathered from a previous study and medical consultants. Following the educational sessions and after analyzing the parent report data, fewer children in the program group missed gym because of asthma. Although the mean differences were not statistically significant, the experimental group reduced their absences by a mean of 7% while the control children increased absences by a mean of 5%.

Another study referring to the effect that asthma has on school absences was conducted in Al-Ain City of United Arab Emirates (UAE). The investigators studied the influence of asthma and wheezing on school attendance of 6-14 year old children (Bener, Abdulrazzaq, Debuse, & Abdin, 1994). A total of 28,447 children (14,217 boys and 14,230 girls) attend schools in Al-Ain. An overall screening for asthma was gathered from information provided by school heads, school staff, school health personnel, and parents. The head teacher of each school then reported the number of children aged 6-14 years on the school roll known to have asthma. A standardized questionnaire and letter

of intent to participate was distributed among those reported pupils. The pupils' parents with the help of a senior medical student and nurse completed the questionnaire. A multistage sampling technique was employed and 300 school children (128 boys and 172 girls) aged 6-14 years were selected. Each student was asked to provide demographic background on themselves as well as their family members.

From the data gathered, the investigators found that asthma was more commonly reported among boys (14.1%) than among girls (10.5%). The median number of days that children were absent from school due to asthma and wheezing was five days a year. There was a significant difference in the number of asthmatic children who missed at least one day of school between age groups, 6-9 (57.3%) and 10-14 (42.7%). Most absenteeism occurred during spring and winter, while the lowest rate occurred in autumn.

Overall, children with asthma appear to be absent more frequently and for longer periods of time when compared to children without asthma. One of the many effects of children with asthma missing school is not being there to gain academic knowledge to advance them in their studies.

Academic Performance

Approximately forty-five percent of students with chronic illness report falling behind in their school work, causing them to dislike school (Lynch, Lewis, & Murphy, 1992). One study that examined the academic performance of asthmatic children was "The Impact of Bronchial Asthma on School Attendance and Performance" by Freudenberg, Feldman, Clark, Millman, Valle, and Wasilewski (1980). Almost 40% of the 200 parents and children enrolled in the study at The Asthma Self-Management Project, a four-year study conducted at Columbia University, reported that one of the

common problems that their child encountered in school was reading difficulties. Approximately 17% of the children in the study were required to repeat a grade. More than 70% of the parents reported that they discussed the child's absences, restrictions of activities, and administration of medication with the teachers. Physical education classes were an area of concern for both parents and children. While most of the parents reported that their school did have a physical education classes, nearly half of the parents reported that asthma sometimes kept their child out of physical education classes and sometimes prevented their child from fully participating in class. Activities that were commonly restricted were running, jumping, vigorous team sports and exercises.

Based on the results of their 1978 baseline data survey, which elaborated on several school problems, Clark, Feldman, Evans, Wasilewski, and Levison provided instruction for parents and children to increase their self-management skills as well as their self-confidence in reference to their asthma related problems (Clark, Feldman, Evans, Wasilewski, & Levison, 1984). Participants (274) were randomly selected from those who attended four pediatric allergy clinics in New York City. The mean frequency of school absences for the children for all causes in the year before the onset of the study was 26 per year.

Separate learning sessions were conducted for parents, children (8-14), and children (4-7). One combined session was held for parents and children. The educational content, gathered from the baseline survey and medical consultants, was organized into six topics. One topic was introduced during a one-hour session each month for a six-month period. The sessions introduced were: (a) how to help your child (yourself) take medicine, (b) how to determine appropriate activity levels for your child (yourself), (c)

how to take care of an attack at home, (d) how to get information from the doctor, (e) how to keep your child (yourself) healthy, and (f) how to help your child (yourself) do well in school.

Of the 274 children that agreed to participate in the study, one-third of the group was assigned to the control group and two-thirds were assigned to the experimental group. Prior to the education, all parents completed an interview that lasted approximately 45 minutes. Parents were interviewed again at the end of one year and school records for each child were reviewed. Differences between the experimental and the control group were analyzed using the Chi-Square test and Analysis of Variance to ascertain statistical significance. Three indices were created to assess children's adjustment to school, their reactions to stress and academic performance. Both the adjustment to school and the reaction to stress indices were taken from parent interview items. The academic performance was created by assigning numeric values to grades and combining those grades received by the child for reading, math, and science.

Following the educational session and after analyzing the parent report data, fewer children in the program group missed gym because of asthma. The index for academic performance showed that while the experimental group children did not have a change in grades, the control group children's grades declined by a half a grade. This may be attributed to the cumulative effects of asthma on a child's school performance. The difference in the changes between the two was statistically significant ($p < .05$), demonstrating that the educational program on family self-management of asthma appears to have provided direct benefits to participating families.

However, not all of the research done in this area is conclusive. Rietveld and Colland (1999) studied the impact severe asthma had on 25 asthmatic elementary school children, aged 10-12 years, compared to children without asthma. Hypotheses that were tested included: (a) children with asthma will score lower on measures of memory, (b) children with asthma will score lower on measures of concentration, and (c) children with asthma will score lower on measures of school performance. Memory was measured using the memory of semantic units test (MSU) consisting of subtests measuring picture recall, word recognition and word recall. The child's level of concentration was assessed with the Bourdon-Vos task measuring their continuous selective attention. School performance was measured using grades for arithmetic, linguistics, and a mean for all other subjects. Independent t-tests were performed on the dependent variables between participants with and without asthma at a significance level of $P < .05$. The children with asthma had no significant difference in memory, concentration, or school performance compared to children without asthma. Although the research on academic performances is not conclusive, children who are absent from school due to a chronic illness may not only fall behind in school, but may also be affected emotionally.

Negative Emotions

Children with asthma may appear to be at a greater risk for psychosocial behaviors such as anxiety, depression, acting out, and stress. However, evidence that the psychosocial behaviors are related to the severity of the asthma is not conclusive. Padur, Rapoff, Houston, Barnard, Danovsky, Olson, et al. (1995) questioned if children's psychosocial adjustment was related to the severity of their disease. One hundred children, 48 boys and 52 girls, aged 8-16 years participated in the study. The children

were grouped 25 to a group according to their chronic disease (asthma, cancer, diabetes, and the control group). Recruitment criteria included children aged between 8 and 16 years, time since diagnosis greater than six months, no sibling or parent with a chronic disease, and accompanied by a parent. After recruitment, the investigators provided the participants with a 10-minute seminar of instructions and a take-home packet that included the questionnaires, to be filled out at home independently, and a self-addressed stamped envelope to return the questionnaires.

The investigators measured the children using five different measures. The first measure taken was the Child Behavior Checklist (CBCL) by Achenbach and Edelbrock which is a self-administered, standardized questionnaire to assess, from the parent's perspective, social competence and internal and external behavior problems for children aged 4-16 years. A higher score on the social competence indicates greater social competence in activities as well as social and school functioning. The internalizing scale is a measure of fearful, inhibited, and over-controlled behavior. The externalizing scale is a measure of aggressive, antisocial, and under-controlled behavior. Similarly, a high score on the behavior questionnaire indicates more severe behavior problems. The second measure taken was the Child Depression Inventory (CDI) by Kovacs, which is a self-administered questionnaire, designed to assess depression in children aged 8-16 years. The CDI provides the parents perspective of the child and the child's perspective of themselves. A high score on the CDI indicates more severe depression. The third measure taken was the Piers-Harris Children's Self-Concept Scale (PH) by Piers, which is a self-report questionnaire, designed to assess how children aged 8-18 years feel about themselves. The results of the PH scale provide an overall score of self-concept and six

cluster scores. The anxiety cluster was the only one assessed. While a high score indicates a positive self-evaluation, a low score suggests a negative self-evaluation and may suggest the need for further evaluation. The fourth measure taken was the Play-Performance Scale for Children (PPSC) by Lansky, List & Lansky, which is a measure on which parents report how restricted their child has been in their activities. It was designed to have no age restrictions. The final measure taken was the child's record of absences and grades for the most recently completed school year.

The statistical analyses of between group differences on measures of adjustment were tested using analysis of variance (ANOVA) or covariance (ANCOVA). To evaluate the extent to which functional status (physical limitations) might mediate the relationship between group status (chronic or healthy) and measures of psychosocial adjustment, analyses (ANCOVA) were performed in which the effect of functional status, as measured by the PPSC, was controlled. PPSC scores were found to be significantly correlated ($p < .05$, two-tailed test) with three of the dependent variables (parent, $r = -.25$; CBCL internalizing, $r = -.34$; and school absences, $r = -.29$). To evaluate their affective adjustment, participants were compared on CDI, CBCL internalizing, and PH anxiety subscale. The analyses of the CDI indicated a significant difference between the groups ($p < .02$), with the asthma group scoring significantly higher than the other three groups. No statistically significant differences were found between the groups on the CDI or PH scores. The analysis for the CBCL internalizing score yielded a significant difference between the four groups ($p = <.01$), with the asthma group scoring significantly higher than the cancer and comparison groups. Groups were compared on the CBCL externalizing and social competence scales, school absences, and grades. The only

significant analysis was for absences, which revealed that the three other groups differed with the cancer group, missing significantly more school than the other three groups. For self-concept, the analysis revealed a significant group difference in participants' overall self-perception ($p = <.04$), with the asthma group scoring significantly lower than the cancer and comparison groups. Functional status revealed a significant difference ($p = <.001$), with the asthma group scoring significantly lower (indicating greater functional impairment) than the other three groups. Therefore, as indicated from the study, children with asthma had more affective adjustment problems, distress and depression, as well as a lower global self-concept. In addition, this study indicated that children with asthma have greater functional impairment compared to children with cancer, diabetes or healthy children.

To measure the amount of stress that children with asthma encounter, Clark, Feldman, Evans, Wasilewski, and Levison (1984) created a stress index that consisted of 12 items pertaining to symptoms of emotional distress such as waking at night, loss of temper, crying, bedwetting, and headaches. They found in their investigation of 274 New York asthmatic children and their parents that prior to the educational intervention the experimental group parents reported significantly fewer problems of stress than did control families. Following the program both groups reported significant decreases in stress.

Although the research is not conclusive, asthma can effect children academically in the number of days absent, their achievement levels, and emotionally. Many children in the research studies were not following any form of a management plan to aid them in better managing their asthma and its effects.

Management of Asthma

A cure for asthma has not yet been found (Center for Disease Control and Prevention, 2001); however, with proper management, asthma can be controlled. The word manages, according to the Webster dictionary means to handle or direct with a degree of skill. This skill can be developed through asthma education programs. Management in asthma education programs is divided into four categories: prevention, intervention, compensatory behaviors and external controlling factors (McNabb, Wilson-Pessano, & Jacobs, 1986). The majority of research has been conducted in the areas of prevention, intervention, and compensatory behaviors as seen below.

Prevention

Preventative behaviors are those that serve to avoid an asthmatic episode or to prevent occurrence of symptoms. These include taking preventive medicines and keeping medicines accessible (McNabb, Wilson-Pessano, & Jacobs, 1986). Some of the most commonly recognized indicators of a potential asthma attack include shortness of breath, persistent cough, constant clearing of the throat, clipped speech, heavier than normal breathing and sneezing (American Lung Association, 2004).

One preventative behavior that aids in the prevention of an asthma attack is the consistent use of a peak flow meter. A peak flow meter is used to measure your "peak flow" or how well one is able to blow air out of their lungs. It provides an objective measure on how well the patient is doing and if their medication needs to be adjusted. A peak flow meter is essentially a plastic tube with a mouthpiece on one end. Inside is a mechanism that moves a pointer along a scale on the outside of the tube when air is blown into the mouthpiece. The scale shows the amount of force with which the air is

blown out of the lungs. It is measured in liters per minute and is called the peak expitatory flow (PEF) (Asthma and Allergy Foundation of America, 1999a; Journal of the American Medical Association Treatment Center, 2000). A peak flow meter can detect the narrowing of the airways, probably before one can feel them. Peak flows should be checked at least twice a day. One's personal best, which is the highest consistent number able to obtain with no symptoms, should be established between a two to three week period (Journal of the American Medical Association Treatment Center, 2000). Once the personal best is established the need for an adjustment in medication can be detected using the PEF readings (Asthma and Allergy Foundation of America, 1999a). Besides using the peak-flow meter on a regular basis, children should be aware of their possible triggers of asthma.

Children that avoid potential asthma triggers can prevent the onset of asthma symptoms or possibly a full-blown asthma attack. There are several known triggers of asthma, but not all triggers are the same for each child (Swanson & Thompson, 1994). Some triggers include: respiratory infections, colds, cigarette smoke, allergic reactions, indoor and outdoor air pollutants, dust mites, fungi, vigorous exercise, exposure to cold air or sudden temperature change and excitement/stress (Lenfant & Khaltaev, 1995). Even laughter is a trigger in some children.

Unfortunately, many of these triggers are found in schools. Most educational classrooms contain some form of carpet in them, a great place for mites to hide out. Even after being vacuumed air borne mites can live on carpeted floors. When allergens and irritants are present in the indoor environment, inadequate ventilation can increase the likelihood that they will exacerbate asthma in susceptible children (Epstien, 2001). Viral

infections tend to be the most frequent precipitating factor for asthma attacks in young preschool and school-aged (K-5) children (Butz & Alexander, 1993; Swanson & Thompson, 1994). Outside of the classroom, children can come into contact with asthma triggers such as grass, pollens, molds, cockroaches, and animal dander making it difficult for children to play outside.

There are two "types" of asthma medication commonly used by an asthmatic, a long-term medication and a short-term medication. A long-term medication, which helps prevent symptoms or attacks over a long period of time, is a prevention medication. Anti-inflammatory medication, long-acting beta2-agonists, and sustained released theophylline are asthma medicines that are long-term and do not work quickly to stop an asthma attack (National Heart, Lung, and Blood Institute, 1997). Long-term medications are taken daily and are safe to use over a long period of time, but have limited effects once the attack has started. Due to its direct delivery to the airway, inhaled medications are preferred over pills or syrup (National Heart, Lung, and Blood Institute, 1997). To prevent the onset of an asthma attack children should monitor their airflow using their peak flow meter, taking their preventative medications on a regular basis and avoiding potential triggers. At the onset of an asthma attack, children should engage in the intervention behaviors.

Intervention

Intervention behaviors are actions taken by the child after the asthma symptoms begin. Intervention actions may include taking asthma medication, removing oneself from precipitating substances or situations (avoiding common asthma triggers) and practicing a variety of asthma interventions (McNabb, Wilson-Pessano, & Jacobs, 1986)

such as using relaxation therapy, or using controlled breathing techniques to ease breathing.

The second type of asthma medication commonly used by asthmatics is the beta2-agonist. A Beta2-agonist works quickly by relaxing the muscles around the airways so they can open and stop asthma symptoms or an asthma attack. These medications are only a temporary solution and are not safe to use daily over a long period of time, as they might cause damage to the heart (Hannaway, 2002). Using short-term medications more often than every four hours, is an indication of increasing asthma severity.

One of the most common inhaled short-term beta2-agonists is Albuterol. Experts recommend that all metered-dose inhaled medications be taken with a spacer (Asthma and Allergy Foundation of America, 1999b). A spacer can be described as a long cylinder tube with a mouthpiece at one end and a place for your meter-dose inhaler at the other end. A spacer is used to improve distribution of medication in the lungs

Medication policy. The standards for school health related services, including the dispensing of asthma medication requiring a prescription, vary from state to state (Francis, Hemmat, Treloar, & Yarandi, 1996) and in some places between school districts. Before September of 2001 Texas did not permit children to carry and use inhalers at school. In Texas, if a child was caught with a controlled or dangerous drug, then according to Chapter 37 of the Texas Education Code, the student might be removed and/or expelled according to the local district policy. Few schools permit children to carry their asthma inhalers with them (Hannaway, 2002) and most medications in school are kept locked in a cabinet either in the nurses or the principal's office. Not allowing children to carry their asthma inhalers can inhibit children from approaching their teacher

(Hill, Brittion, & Tattersfield, 1987), properly managing their asthma, and may even be a death sentence (Kritz, 2003). An unknown number of students die at school each year during an asthma attack because immediate access to prescribed lifesaving medication was restricted. Both The American Academy of Allergy, Asthma, and Immunology (2000) and the Council on Child and Adolescent Health (1993) support that children should be allowed to carry their inhaled asthma medications with them at school.

Many states have passed legislation giving students the right to carry their inhalers with them at school. In the summer of 2000, only six states had passed legislation (Florida, Massachusetts, Michigan, Oregon, Wisconsin, and Virginia). Today, thirty three states (Alabama, California, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Jersey, New York, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Texas, Tennessee, Utah, Virginia, West Virginia, Wisconsin, and Wyoming) give students legal rights to carry their asthma medications with them at school. In June 2001, Texas passed a statute, Self-Administration of Prescription Asthma Medicine by Students Act that allows children to self-administer asthma prescription medication. Chairman Sadler of the Texas Public Education committee said it best when he remarked that, "it is a shame that we have to look to pass a law for a common sense solution". The Self-Administration of Prescription Asthma Medication Act (Self-Administration of Prescription Asthma Medication Act, § 38.013, 2001) states for a child to possess and self-administer asthma prescription medication in Texas, if the prescription asthma medicine has been prescribed for that student as indicated by the prescription label on the medicine, the self-

administration is done in compliance with the prescription or written instructions from the student's physician or other licensed health care provider, and the school must keep on file a note from the parent authorizing the student to self-medicate. In addition to the note from the parent the school must also have a note from the student's physician stating the following: (a) that the student is capable of self-administering asthma medicine, (b) the name and purpose of the medicine, (c) the prescribed dosage, (d) the times at which it is to be administered, and (e) the period for which the medicine is prescribed.

During the testimony for this statute, which passed in the house on April 23, 2001 with 145-0 and in the senate on May 17, 2001 with 30-0, several advocates for this piece of legislation spoke on the benefits and concerns of having asthmatic students' self-medicate. Ava Wood, from the Asthma Coalition of Texas, discussed one benefit of allowing children to self-medicate when needed was the cost of an emergency room visit, which often can exceed $500 plus missed work for parents and missed school for the child. One concern that was mentioned during the testimony for the Self-Administration of Prescription Asthma Medication Act, § 38.013 (2001) was if another non-asthmatic student inhales from the metered-dosed inhaler is that child's health at risk? Dr. Bennie McWilliams a pediatric pulmonologist and representative of the American Lung Association stated that the student would not be in grave danger unless they had a heart condition. One puff "will raise the child's heart rate and make them nervous," said Michelle McComb from the Texas Department of Health. Another concern mentioned by Chairman Sadler was school liability. Representative Oliveira stated that having a student self-administer asthma medication does not waive or create liability for school districts. Jackie Shobe, a school nurse in San Antonio, testified that she supports students

self-medicating, but also requires her students to keep an extra inhaler in the nurse's office in case they lose one.

Compensatory Behaviors & External Controlling Factors

Compensatory behaviors are actions demonstrating the child's adaptation or adjustment to asthma. Dealing with peers and accepting primary responsibility for managing one's own condition are among the behaviors seen in this category (McNabb, Wilson-Pessano, & Jacobs, 1986). In contrast, external controlling factors are actions by adults that impinge on the child's ability to self-manage. These adults may deny the condition, fail to provide help, interfere with treatment, or use the condition to manipulate the child and family problems that precipitate attacks (McNabb, Wilson-Pessano, & Jacobs, 1986). Many researchers (Persaud, Barnett, Weller, Baldwin, Niebuhr, & McCormick, 1996; Wigal, Creer, Kotses, & Lewis, 1990) argue that it is best if the child has more control and be involved in the management of their asthma. The following will review some of the existing self-management programs for children.

A Review of Existing Self-Management Programs

Asthma is the most frequently cited chronic disease associated with childhood mortality rates (Newacheck, Budetti, & Halfon, 1986; Persaud, Barnett, Weller, Baldwin, Niebuhr, & McCormick, 1996). Although the number of asthma related childhood deaths is smaller compared to other causes of childhood death (accidents, cancer, etc.), asthma related deaths remain a concern with all the available asthma management programs.

Education about asthma begins in the physician's office. This education is usually directed at the parents more than the child and consists of a brief review of asthma and the medication prescribed for its management (Evans, Clark, Levison, Levin,

& Mellins, 2001; Hannaway, 2002; Richards, Church, Roberts, Newman, & Garon, 1981). For children with mild asthma, that occurs infrequently, this type of education is sufficient. However, children with more severe asthma need a more in depth self-management program (Wigal, Creer, Kotses, & Lewis, 1990). Most asthma self-management programs have been derived from the treatment and rehabilitation program developed over 40 years ago at the Children's Asthma Research Institute and Hospital (CARIH) in Denver. Originally, children who attended the CARIH program spent 18-24 months in cottages with medical staff and other asthmatic children at which time they had ample opportunities to learn self-management strategies. However, with the improvements in medication over the years, the staff was able to shrink the length of stay to six months or less. The treatment facility at CARIH closed in 1981. As a result of CARIH, a self-management conference represented by eleven self-management programs was held in 1981. From that conference, four common goals of self-management emerged: (1) to prevent and control asthma, (2) to reduce financial costs incurred for asthma, (3) to reduce the impact of asthma on the children and their families, and (4) to teach children, through cooperation with their physicians, to shoulder greater responsibility for the management of their asthma. Children who participate in such programs have an increase in attendance and achievement in school (Evans, Clark, & Feldman, 1987a), learn more about their asthma and feel better about their capability to manage their own symptoms (Persaud, Barnett, Weller, Baldwin, Niebuhr, & McCormick, 1996).

Wigal, Creer, Kotses, and Lewis (1990) conducted a review of self-management programs that are designed to teach self-management skills to children with asthma and

their families. The review includes a brief description of each program, including intervention techniques, experimental design, dependent measures and evaluation, as well as strengths and weaknesses of each program. Open Airways and Teaching My Parents/Myself about Asthma programs will be discussed in detail later under school based self-management programs. Brief summaries of Wigal et al's results are below.

Clinical Based Programs

ACT for kids. ACT (Asthma Care Training) for kids was designed and tested at UCLA for children aged 7-12 years. ACT is not used as a replacement for a personal physician, but rather as a compliment of good medical care. The program is based upon several principles: (a) children must be active participants in preventing and controlling their asthma symptoms, (b) children must be able to recognize the initial symptoms of an impending episode and must know appropriate actions to take to alleviate the attack, (c) children and their parents must be treated as equals and partners in learning self-management procedures, (d) children must learn skills to increase their sense of accomplishment and mastery, (e) parents of asthmatic children should be taught nurturing skills to create a home environment in which the children can practice self-care and decision-making, and (f) children must be taught the basic skills of decision-making and relaxation.

A central theme of the program is to place children in the "driver's seat" with respect to their health through the use of traffic light signals for medication and prevention (Lewis, Rachelefsky, Lewis, de la Sota, & Kaplan, 1984). Green represents taking medications and controlling asthma symptoms, yellow represents taking a more cautious approach involving medications and other techniques as mild symptoms have

occurred, and red represents that severe symptoms have occurred and it is time to take medications that will stop the episode. Parents are also taught to use the same traffic light paradigm as children. Green being a decision that a child can make independently, yellow are decisions that parents and children make together and red are decisions that parents and physicians make for the child.

Based upon allergy records, a total of 88 children and parents were enrolled in the original study, but due to scheduling conflicts or lack of transportation, only 76 were randomly assigned to either the experimental or the control group. The experimental group, comprised of 48 children and parents, met for five one-hour sessions in which the first 45 minutes the parents and the children were separately taught the same information. During the last 15 minutes parents and children reconvened and discussed what they had learned. The control group, comprised of 28 children and parents, met for three 90-minute lectures over the same material that was covered in the experimental group. A discussion session followed each lecture. Few dependent variables were assessed.

Children and their parents were interviewed prior to the first lesson and reinterviewed by phone at 3, 6, and 12 months. The investigators reported several findings, both groups exhibited equivalent increases in understanding of asthma and its management, including knowledge of asthma triggers. Both groups showed significant reductions in the perceived severity of their asthma episodes. In addition, parents in both groups rated their children's health as significantly better than they did in the pretest. The parents in the experimental and control group reported an increase (significant at the .05 level) in their children remembering to take extra medication when necessary. The hospitalizations, per child each year, for the control group was 33% higher ($p = 0.08$)

than that of the experimental group. In addition, only the experimental group demonstrated a significant reduction in parents' reports of children's dependency on adults for care. Lewis, Rachelefsky, Lewis, de la Sota, & Kaplan (1984) concluded that through modifications in family dynamics related to the child's asthma, compliance with treatment recommendations and desired behavioral outcomes can be achieved.

Air power /Air wise. The America Institutes for Research in the Behavioral Sciences at Palo Alto, California developed Air Power and Air Wise as a result of a comprehensive study of the behaviors used in the prevention of asthma flare-ups in asthmatic children (McNabb, Wilson-Pessano, Hughes, & Scamagas, 1985). Air Power is for asthmatic children aged 9-13 years and consists of four weekly one-hour sessions that are broken down into information giving, group discussion, and relaxation training. Parents of the asthmatic children are taught how to be better supporters of their child's efforts in self-management. A study of 52 children comprised of 15 in the experimental group and 37 in the control group were selected from the Kaiser-Permanente Medical Groups. The control group received no intervention, but continued to receive their usual medical treatment. Only those children who were continuing to contribute at least 65% of the data from an earlier pilot study were selected to participate in the study. In addition, there was no confirmation as to the diagnosis of asthma for these children. Several dependent variables were used including drug regimens, number of emergency room visits for asthma, and frequency of clinic visits for asthma. Although no statistical analyses or probability values were reported, the investigators did report the frequency of the experimental group's self-management behaviors was higher than that of the control group. No changes were observed with any of the dependent variables.

Air Wise is an individualized educational program for asthmatic children aged 9-13 years and incorporates the teaching of goal setting, self-evaluation, and self-monitoring (McNabb, Wilson-Pessano, Hughes, & Scamagas, 1985). Although the program is individualized for the child, it does involve the child's parents, physicians, and nurses. Sixteen children who were recruited from the Kaiser Permanente Clinics were randomly assigned to an experimental or a control group. The sixteen were chosen based on the clinic where they enrolled, the number of emergency treatments for asthma during the previous year, their asthma medication regimen, and their age. Children in the experimental group received four, 45 minute weekly, individually tailored sessions of the self-management of asthma. The control group received no self-management instruction, but did continue to receive medical treatment. The number of emergency treatments for asthma, number of non-emergency physician contacts for asthma per month, and current asthma drug regimen were assessed by reviewing medical records one-year prior to the investigation and one-year after the investigation. The investigators reported: (a) there were no differences between the two groups on the major dependent variables, (b) the experimental group did have fewer emergency room visits that were asthma related, (c) no difference in post-treatment non-emergency visits or drug scores between the two groups, (d) improvements in knowledge of asthma or changes in self-management behaviors were reported from the experimental group, and (e) the immediate cost savings per year for each child was estimated to be $507 following their participation in Air Wise (McNabb, Wilson-Pessano, Hughes, & Scamagas, 1985).

Asthma summer camp program. Asthma Summer Camp, held in Los Angeles by the American Lung Association, incorporated a self-management program that would

increase children's knowledge of asthma, increase parents' knowledge of asthma, improve self-perceptions the children had of themselves and their asthma, improve asthma medication compliance, and improve the children's behavior (Robinson, 1985). Ninety children, aged 10-14 years, were selected from a pool of 200 applicants who had been confirmed as having asthma by a physician. All children and parents participated in the summer camp program. Two weeks prior to the summer camp, the participants' parents were required to attend a general meeting to discuss the purposes of the camp with the medical staff and the type of evaluation procedure planned. Groups of 15-20 children were taught six 45-minute module instructional courses that included: warning signs and attack triggers, environmental control, food allergy, breathing exercises, postural drainage, anatomy and psychosocial aspects of asthma, and communicating with the doctor and other health professionals. Each module instructional course was taught through audiovisual presentations, hands-on demonstrations, special asthma games, and discussion periods.

The evaluation of the program focused on basic goals of the program: (a) to increase the children's knowledge of asthma, (b) to increase the parents' knowledge of asthma, (c) to improve the children's perception of themselves and their asthma, (d) to influence positively the children's compliance with medical treatment; and (e) to influence positively the children's behavior. Campers and their parents were tested at the beginning, end, and three months after the end of camp on their knowledge of asthma and perceptions of the children's ability to comply with medical treatment and manage the disease. The investigators reported: (a) that children and parents showed improvement in their knowledge of asthma three months after camp, (b) children's perceptions of the

frequency or severity of their asthma did not change, (c) parents viewed their children's asthma as less disabling after camp ($p < 0.01$), (d) children's confidence with respect to remember to take medications after camp improved ($p < 0.01$), and (e) parents reported that their child's asthma improved as well as their ability to self-manage ($p < 0.01$).

Camp wheeze. Camp Wheeze was implemented and tested in 1978 at The Children's Hospital at Stanford University. There were two goals of the program: to increase patient and family understanding of asthma and to encourage self-reliance and the development of self-help skills in children with asthma (Blessing-Moore, Fritz, & Lewiston, 1985). One hundred sixty children aged 6-15 years, grouped only by age, participated in five sessions emphasizing information on anatomy and physiology, normal lung structure, the mechanics of breathing, the definition and causes of asthma, and the diagnosis, treatment and prevention of the disorder. A handbook was provided to children, parents, teachers, and recreational directors. All participants were pre-tested and post-tested on the educational content of the material months later. Parents participated in a 12-month subjective evaluation of the program. The diagnosis of asthma, by a physician, was not required for the participating children and no control group was established in the study.

Several dependent variables were used to evaluate the program's effectiveness. These include: (a) asthma knowledge, (b) the ability of the child to help himself or herself during an attack, (c) the ability of the parent to cope with an episode, (d) school absenteeism, (e) the child's school behavior, (f) peer support for the asthmatic child, (g) knowledge of community resources for asthma, and (h) the amount of family support for the child with asthma. Parents reported several changes in their children following

participation in the program. These changes include improved understanding of asthma, decreased school absenteeism, improved self-help skills, positive changes in school behaviors, more discussion of asthma with peers, improved medication compliance, increased participation in extracurricular activities, and decreased number of hospitalizations for asthma, and improved ability to cope with the stress of this illness.

Children's Hospital of Pittsburgh. This program was designed to teach self-management skills both individually and in groups to children aged 2-14 years and their parents (Fireman, Friday, Gira, Vierthaler, & Michaels, 1981). A pediatric allergist who confirmed asthma in 26 children evaluated each child. Goals of the program were: (a) to reduce the number and severity of asthma attacks, (b) to reduce school absenteeism due to asthma, (c) to reduce the number and severity of asthma attacks, (d) to reduce school absenteeism due to asthma, (e) to reduce emergency room visits and hospitalizations due to the disorder, and (f) to develop positive family attitudes toward asthma management.

In order to control potential concurrent independent variables, each child's medication regimen was tailored to better meet their needs prior to the investigation. Following this, each child received a management plan that included information on avoidance of attack triggers, drug therapy, and immunotherapy. Children and families were placed sequentially in either the experimental group (n = 13) or the control group (n = 13). All children and families were given the same general instructions concerning asthma by the pediatric allergist. Over a 12-month period, children and families in the experimental group met individually with a nurse practitioner for four one-hour sessions and met twice for a two-hour group lecture and discussion. Topics covered in the discussion included pulmonary physiology, asthma triggers, drug actions, and self-

management. In addition, the nurse educator contacted the children by phone every two to three months to ensure their symptoms and their medication diary was current. Children in the control group had no contact with the nurse educator.

The investigators assessed several dependent measures including symptoms, medications, school attendance, emergency room visits, asthma related hospitalizations, family attitudes and knowledge of asthma. The results reported were: (a) children in the experimental group averaged over a period of 12 months, 2 attacks and children in the control group averaged 6 attacks ($p < .01$), (b) children in the experimental group had a school absentee rate of .5 days per child due to asthma and the absentee rate for the children in the control group was 4.6 days per child ($p < .05$), (c) children in the experimental group were not hospitalized during the period of the study and children in the control group experienced four hospitalizations, and (d) at the conclusion of the study 9 of 13 families in the experimental group felt that their child's asthma had improved due to the use of medications; only three of these 13 families attributed the improvement to a better understanding of their child's asthma. However, 10 of 13 parents in the control group also felt that their child's asthma had improved. Eight of the control group families attributed their child's improvement to the medications used rather than to a better understanding of the disease.

Community program for childhood asthma. In 1966, the Respiratory Disease Association of Hennepin County, Minnesota instituted the Community Program for Childhood Asthma. It is one of the earliest community programs for childhood asthma. The program had three goals which included improving the physical condition of the asthmatic child, improving the child's psychosocial adjustment to asthma and to educate

the child, family, and community about asthma (Blumenthal, Cushing, & Fashingbauer, 1972).

To attain these goals, a school-year program and a summer camp program were developed. The school year program was designed for the child whose bronchial asthma interfered with daily activity. The program utilized a vast array of specialists to assist in the program. A total of 209 children who were diagnosed with asthma by their physician participated in 8 to 12 weekly classes lasting approximately one to two hours each. Parents and children participated in separate classes. The program included a group discussion with a social worker, followed by training in breathing techniques and cardio-respiratory conditioning, and ended with a brief group gathering to gain recognition and reinforcement for the children's performance. The parents' sessions consisted of both informal and planned group discussions, which served to keep the parents informed of what their child was being taught. The instruction material for the parents was similar to the one for the children in that a specialist discussed the physiology, pathology, treatment, and management of asthma.

The first summer camp was held in 1967. Criteria for admission to the summer camp program included completion of the school-year program and the inability to attend regular camp due to asthma. The camp staff consisted of camp counselors and medical staff. The camp was conducted as normally as possible without giving undue attention to the children's asthma. The children were involved in sports, arts and crafts, as well as cabin responsibilities. Campers were evaluated by their parents' and the camp's staff regarding attendance of future asthma camp sessions or having the child move on to a "regular" camp.

Several dependent variables were assessed on the children throughout the investigation including physiological measures of exercise, paper-and-pencil instruments designed to assess attitudes, behaviors, knowledge of asthma, and interviews with the children and their parents. Data was not analyzed with statistical procedures. The investigators reported the following: (a) no consistent changes in pulmonary function measures, (b) an increase in physical ability in the children, and (c) all parents showed improvement in their knowledge of asthma.

Living with asthma. Living with Asthma was developed at the Children's Asthma Research Institute and Hospital (CARIH) in Denver, beginning in 1979 and ending in 1981 (Creer, Backial, Burns, Leung, Marion, Miklich, et al., 1988). Social learning and behavioral techniques are the two major techniques used in this program. The program emphasizes the translation of learning through educational intervention into behavior changes, such as the use of self-management skills. A total of 399 individuals, including parents, siblings, and grandparents participated in the initial Living with Asthma program. Of those, only 123 children, diagnosed with asthma, participated in the study. The 123 children ranged in age of 5-17 years. When 10 families had been randomly assigned to either the training group or a waiting list control group the training began. Children and families in the training group participated in eight weekly sessions. The first four weeks were based on the teaching of self-management skills and the last four weeks were based on the performance of the self-management skills. Each session was tailored for the level of the participants: children (5-12), adolescents (13-17) and adults, who met separately for the presentations.

Four types of dependent variables were measured in the study: (a) paper and pencil instruments including the Asthma Problem Behavior Checklist, the Asthma Precipitant Survey, the Children's Attitude Survey and the Adult Asthma Attitude Survey, the Piers-Harris Self-Concept Scale, (b) pulmonary physiology measures, (c) self-report measures that assessed attack data, medication compliance, and asthma expenses, and (d) morbidity data, including school absenteeism and the cost of asthma. Findings (all significant at the .05 level or beyond) from the study include: all participants showed a significant improvement in knowledge of asthma as a result of participation in the program, a positive change in attitudes toward themselves and toward asthma was seen by both parents and children, a reduction in asthma attacks occurred, a significant reduction in school absenteeism was reported, and a significant reduction in health care costs occurred.

Self-care rehabilitation in pediatric asthma. The American Lung Association of Utah, in conjunction with the Department of Family and Community Medicine at the University of Utah School of Medicine and the Primary Children's Medical Center developed and evaluated the Self-Care Rehabilitation in Pediatric Asthma (SCRPA). SCRPA was used to assess the level at which asthmatic children acquire asthma knowledge and skills presented in self-management training. Whitman, West, Brough, and Welch (1985) believed that by gaining knowledge about asthma one would be more effective in their management of asthma.

Twenty-one preschool children (aged 2-5 years) and 38 school age children (aged 6-14 years), matched for sex, age, asthma severity, and season of worst asthma, were randomly assigned to either an experimental or a control group. The preschoolers (aged

2-5 years) attended six one-hour sessions held twice weekly for three weeks. The first and last classes were for one or both parents and the middle four sessions were for the child and parent(s). The preschool children were not matched with a control group due to the length of the study. The school aged (aged 6-14 years) experimental group attended eight 90-minute sessions held two times a week for four weeks for both child and parent(s). The school-age children were randomly assigned to an experimental or a control group, which received the training at the end of the study.

Both the preschoolers and the experimental school age children were provided instruction in breathing control, body relaxation, bronchial hygiene, respiratory anatomy, and asthma medications. The school age children received additional instruction in asthma triggers, early warning signs, and the emotional effects of asthma. Participants in the program were evaluated in the beginning, at the end, and three months after the program. Families were asked to complete an Asthma and Family History Survey, an asthma episode summary and weekly asthma logs for three months prior to training, during training, and three months after the training. The asthma episode summaries were a description of each asthma episode as it occurred including time of day, length or episode, location of child, use of medication, etc. The weekly logs, filled out by the parents, provided an impression of their child's asthma condition for each day of the week.

In addition to the journals the investigators gathered data from a written ten item multiple choice asthma knowledge test that was administered to the preschool children, school-aged children and parents at the beginning, at the end of the training program, and again three months later. The school-age children also took the Children's Health Locus

of Control by Parcel and the parents took the Parents Asthma Attitude Scale developed by Creer. The matched control group of school-age children and their parents completed the asthma knowledge and attitude tests at the same times as the experimental group.

The investigators found: (a) a significant decrease in both the number of asthma episodes ($p < .01$) and the number of days of severe attacks ($p < .04$) for the preschoolers, (b) a significant increase in knowledge ($p < .01$) and self-care ($p < .01$) was exhibited by the school aged children, while the control group showed an increase at the three month follow up ($p < .02$), and (c) the school aged children in the training group showed no significant changes in their attitudes, but those in the control group did ($p < .01$).

Superstuff. Superstuff, sponsored by the American Lung Association (ALA), is a self-administered, self-management training program used by children and parents with no outside support. The program stresses competency, self-efficacy, and cognition while gaining scientific understanding of asthma, performance, and cooperation between children, family and physicians. To make learning fun, each child's manual includes games, stickers, models, stories, puzzles etc. Parent's receive a non-technical, illustrated news magazine entitled "How to Control Asthma". Both the manual and magazine stress individual control over asthma and include statements such as "I control" and "I understand".

ALA chapters across the United States recruited 321 families to participate in a study. Each family physician confirmed a diagnosis of asthma. Families could not have had any contact with another self-management program or Superstuff prior to the study. Participating families were randomly assigned to the experimental or control group. Those families in the experimental group received the Superstuff curriculum

immediately, while the control group received the curriculum six months later. Dependent variables included in the study were asthma knowledge, self-concept, asthma-related problems, attitudes towards asthma, and school attendance. Follow-up evaluations occurred 4, 6, 8, 11, and 12 months after intervention. Significant findings include increased asthma knowledge, increases in positive attitudes towards asthma, fewer absent school days, increased self-concept, and fewer school problems.

School Based Self-Management Programs

Most health education programs within the school system are designed to prevent the occurrence of common illnesses while health education programs within the clinic or community setting have focused on chronic disease management (Kaplan, Rips, Clark, Evans, Wasilewski, & Feldman, 1986). Chronic disease management for children within the school system is almost never seen (Evans, Clark, Feldman, Rips, Kaplan, Levison, et al., 1987b). Open Airways was the first parent/child clinic-based program to be changed to a child-centered school based program. There are several advantages to having an asthma management program within the school: (a) schools provide a central meeting place which all children have access, (b) it provides a means for parents and staff to communicate about symptom management, physical activity, and keeping up with homework, and (c) most importantly it provides health education to parents and children (Evans, Clark, & Feldman, 1987a). Two programs that address the management of asthma, a chronic disease, within a school setting are "Teaching My Parents/Myself about Asthma" and "Open Airways", both of which will be discussed in detail below.

Teaching my parents/myself about asthma. Parcel and Nader (1977) developed the first school-based asthma management program "Teaching Myself about Asthma" at

the University of Texas. The program focuses on children aged K-5th grade and is delivered in 24 weekly sessions by a team of classroom teachers, resource teachers, school psychologists, and nurses. Parcel and Nader conducted the first pilot study with 13 elementary school children. However, due to poor parental attendance and lack of significant changes in medical outcomes, an educational book was added, "Teaching My Parent/Myself about Asthma" (Parcel, Nader, & Tierman, 1980). The book's focus is on five skills: (1) observation of asthma triggers and symptoms, (2) discrimination of changes in symptoms, (3) communication with other people about symptoms, (4) decision-making about prevention or management, and (5) self-reliance in caring for asthma (Evans, Clark, & Feldman, 1987a). A follow-up study was conducted and children who participated in the program showed an increase in knowledge about asthma and a greater feeling of control over their asthma. No data on school attendance or performance was reported (Parcel, Nader, & Tierman, 1980).

Open Airways. The second asthma management program developed for a school setting was Open Airways (Evans, Clark, & Feldman, 1987a). The original Open Airways program was developed and evaluated at Columbia University (Evans, Clark, Feldman, Rips, Kaplan, Levison, et al., 1987b) and funded by the National Heart, Lung, and Blood Institute as a clinic-based asthma education program. Kaplan, Rips, Clark, Evans, Wasilewski, & Feldman (1986) conducted a clinical study using Open Airways in four of New York City's hospitals, hoping to gather a population in which Open Airways was intended; inner city, low socioeconomic, minority population. Two hundred sixty-nine families enrolled in the clinic program; 55% were Hispanic and 38% were non-Hispanic black. Sixty percent of the children were male and the average mean age was

9.2 years. To improve on attendance the health education sessions were held, both in Spanish and English, while families were waiting for medical appointments. The six sessions incorporated self-management skills with a goal of helping parents and children communicate and work together to better manage their child's asthma. The program was credited for making a positive impact on self-management skills and school grades as well as a reduction in emergency room visits and hospitalizations due to asthma. However, attendance was a problem for families with an average attendance of 3.3 out of six classes and 18% not attending any classes. Some possible explanations for the low attendance were: (a) the main caretaker in the family was employed and had difficulty attending, (b) parents that were not legal residents may have felt alienated from the school system, and (c) others may have not felt obligated since their child's eligibility was not based on parental attendance.

To have a better representation of all children with asthma Kaplan, Rips, Clark, Evans, Wasilewski, & Feldman (1986) took their asthma health education program to the New York public schools. A pilot study using two elementary schools in the upper west side of Manhattan was conducted. The children in the school and clinic studies were comparable in terms of ethnicity and socioeconomic status. Through a phone screening process, 119 children (5% of the school's population) were found to have asthma. However, only 67 parents agreed to enroll themselves and their child in the educational program due to fear of being stigmatized as an asthmatic and not wanting to pull their child out of regular class time. In addition, the school staff was concerned about the limited amount of space within the school and due to previous failures, the completion of the asthma health education program.

Content of the school based sessions was the same as the previous clinic-based study. However, more emphasis was placed on finding participants a regular source of asthma health care and discussions increased concerning school attendance and participation in school activities. Sessions for children were held at school during school hours on alternative days during a three-week period. With teacher and parental approval, children were removed from their regular education classes, for a short period of time, to attend the asthma health education classes. Separate sessions were held for K-2 grades and 3-6 grades. Parent sessions were diminished from six to four without eliminating any of the education information. Parent's sessions were held in the morning immediately after school start time due to parents being able to accompany their children to school. Additional sessions were held in the evenings and on the weekends for those parents who were unable to attend the morning sessions. Since the children in the study were already at school, attendance for the children was high. However, attendance for the parents remained low. Having such a low attendance by parents made it difficult for the joint parent/child sessions.

One year after the original pilot school study, Kaplan, Rips, Clark, Evans, Wasilewski, & Feldman (1986) implemented a second school program using 12 New York City elementary schools. It was hypothesized that the asthma health education program would: (a) increase the use of asthma self-management skills by children, (b) increase levels of children's self-efficacy, (c) increase positive influence by children on the parents' asthma management decisions, (d) improve school attendance, and (e) improve grades. There were three objectives in this research: (1) to overcome low parental attendance seen in the previous studies, (2) to examine the capacity of children

to initiate appropriate health actions and to influence their parents' asthma management decisions in positive ways, and (3) to explore the role of self-efficacy in maintaining new management behaviors by children (Evans, Clark, Feldman, Rips, Kaplan, Levison, et al., 1987b). Two hundred thirty-nine children were enrolled from 237 families with similar backgrounds as the pilot study. The 12 schools were paired up according to ethnic composition and size. One school would act as the experimental group and the other would act as the control group, making a total of 134 children in the experimental group and 105 children in the control group. Once the study was complete, the control group then received the asthma health education program.

Several changes were made in the original asthma health education program. Due to the original program being dependent on direct parental participation and the original program focusing on the parents' central role in managing the disease, changes were made that included: (a) the teaching format was revised and both parents and younger children were eliminated, (b) asthma management switched from the parent's managing their child's asthma to the child self-managing their own asthma, and (c) children's participation was no longer contingent on their parent's. The program focused on the child being a self-manger and being able to recognize his/her asthma symptoms. In addition, the program allowed children to practice and rehearse the management skills they learned in class. Homework was assigned to help promote communication between parents and students about asthma. The program provided parents with written information on the lesson their child learned in class that day and about their child's new asthma management plan. A health educator taught the curriculum to children during school hours using provided stories, games and role-play to aid children in the

development of their management skills. The school program consisted of six 60-minute sessions held over a two to three week period. The session topics included: (a) basic information and feelings about asthma, (b) how to recognize and respond to symptoms of asthma, (c) using asthma medicines and deciding when to seek help, (d) how to keep active physically, (e) identifying and controlling triggers to asthma symptoms, and (f) handling problems related to asthma and school.

Data were collected from school records, medical records, and separate interviews with the parents. Baseline data were collected immediately preceding the intervention and follow-up data were collected one-year after the completion of the program. Changes in behavior and feelings of the children were evaluated with three indexes. The first measure was an index of 36 self-management activities performed by the child. The second measure was an index of self-efficacy with respect to the performance of 13 asthma management behaviors. Children were asked to rate, on a three-point scale, the degree of certainty that they could perform the 13 asthma management behaviors. The last measure was an index of the influence that the children had on parental decisions on attending school and going to the emergency room. School attendance was measured on the number of day each child was absent, school performance was measured on grades and standardized test results. To assess the frequency of asthma episodes, parents counted the number of episodes and the lengths of each episode.

A multivariate analysis of covariance was used to test the hypothesized outcomes of the health education program. These include: (a) more frequent use of asthma self-management skills by children, (b) higher levels of children's self-efficacy, (c) greater positive influence by children on the parents' asthma management decisions, (d) fewer

school absences, and (e) improved grades. The children who completed the program showed an increase in the number of actions they took to manage their asthma, an increase in school performance, an increase in their feelings of self-efficacy, an increase on their influence on parental management decisions, fewer and shorter episodes of asthma attacks, felt more positive about school and received more social support from other children in school (Evans, Clark, & Feldman, 1987a; Evans, Clark, Feldman, Rips, Kaplan, Levison, et al., 1987b).

In light of studies that have demonstrated effectiveness of the Open Airways program, the American Lung Association has adopted this program for the self-management of asthma for children. The 1998 curriculum of Open Airways for Schools adopted by the American Lung Association is slightly different than the one mentioned in Evans, Clark, Feldman, Rips, Kaplan, Levison, et al. (1987b). The 1998 curriculum is divided into six 40-minute group sessions held during the school day. Again, each session is taught utilizing group discussion, stories, games, and role-playing. The topics of the six sessions are: (1) basic information/feelings about asthma, (2) recognizing and managing asthma symptoms, (3) solving problems with medicines/deciding how bad symptoms are, (4) finding and controlling asthma triggers, (5) keeping your battery charged, how to get enough exercise, and (6) doing well at school. Throughout the six sessions are basic health messages that are provided by the instructor. Those messages are: (a) asthma is treatable, (b) asthma episodes do not have to be a crisis, (c) prescribed medicine should be taken at the first sign of symptoms or at the first sign of a cold, (d) solutions to problems can be found, and (e) a child with asthma should live as normally as possible.

Evans, Clark. Feldman, Rips, Kaplan, Levison, et al. (1987b) provided a foundation in the exploration of the capacity of children to initiate management skills and to influence their parents' asthma management decisions in positive ways. However, little research has been conducted on the relationship of asthma self-management, asthma self-management knowledge and student outcome predictors. Unfortunately, many of the positive results seen in the school-based asthma self-management programs are only temporary. Not all children will remain successful with their newly obtained asthma self-management skills. Often, the children will dismiss the new information they received from the asthma self-management program and return to their old management ways.

Self-Efficacy

Despite the progress in our understanding of asthma, the availability of safer and effective asthma medication, and the contribution of self-management programs like "Open Airways for Schools", few students engage in self-management behaviors (Hannaway, 2002). Providing children with the asthma self-management program may not be enough. Bandura (1997) argues that availability of information regarding a new behavior is not sufficient for the adoption of a new behavior. The probability that a person will perform a behavior is related to the person's beliefs that he or she has the knowledge and ability to perform the behavior and that the behavior will result in a beneficial outcome (Bandura, 1997).

A number of strategies have been developed to try and assess one's attitude towards asthma self-management, including measuring the person's self-esteem or using an asthma attitude survey (Evans, Clark, Feldman, Rips, Kaplan, Levison, et al., 1987b). Both of these methods assess only general changes in self-esteem and are not specific

enough to reveal the person's self-esteem in relation to their perceived ability to apply asthma management skills. A third approach, that of using a locus of control scale (the extent to which an individual perceives control over an event) has been used and found to have significant results. A final approach is the assessing of one's self-efficacy of asthma self-management. Asthma self-management programs based on self-efficacy improve the quality of health and reduce the need for medical services (Letz, 2002).

Self-efficacy is what you believe you can do, with the skills you have, under different circumstances (Bandura, 1997). Self-efficacy determines if one will initiate the behavior change, the effort expended, and persistence over obstacles (Bandura, 1977). People who have strong self-efficacy will persevere over obstacles and are more likely to be successful in other situations (Bandura, 1997) such as better attendance and higher achievement. Children who have a general sense of control might have a higher self-efficacy, which in turn can contribute to a more successful adoption of a self-management plan (Schiaffino & Revenson, 1992). Self-efficacy is specific to particular activities (Holman & Lorig, 1992). In other words, one can feel high self-efficacy for knowing how to use an inhaler, but not feel efficacious for knowing what the triggers one should avoid are. There is a growing body of evidence to support the usage of self-efficacy to predict sustaining behavior change across a range of medical problems, including management and control of diabetes (Kavanagh, Gooley, & Wilson, 1993), management of chronic disease (Holman & Lorig, 1992) and management of rheumatoid arthritis (Schiaffino & Revenson, 1992).

Schiaffino and Revenson (1992) examined the relationship among perceived control, self-efficacy, causal attributions and their relation to concurrent, and later

adaptation to a stressful illness event. Their sample consisted on 64 adult patients with rheumatoid arthritis (RA). RA is characterized as a chronic illness that is unpredictable, often leaving the patient with no feeling of control. Patients participating in the study had to have been diagnosed with RA with in the past two years, able to read and write English, 18 years or older, and had no record of psychiatric disorder. The majority of the respondents (90%) were female.

Perceived control was assessed using Bandura's notion of outcome expectancies: The items were answered on a five-point agree-disagree scale and were correlated .37 ($p < .05$). The scores were averaged to yield a single perceived control score. Self-efficacy was evaluated with three self-report items assessing respondents' perceived ability to manage their pain, to deal with physical limitations, and to continue daily activities despite the illness. Again, the three items were on a five-point scale and were averaged to form an index. Also evaluated were casual attributions, adaptational outcomes (depression) specific to RA patients, and functional disability using the Arthritis Impact Measurement Scale. Using a hierarchical multiple regression analysis, Schiaffino and Revenson (1992) found that self-efficacy can predict control and disability at a rate better than chance. Due to self-efficacy, individuals in the study were able to engage in a variety of activities despite the arthritic pain; thus satisfying Bandura's beliefs of outcome expectancies (control) and self-efficacy expectations.

Similarly, Kavanagh, Gooley, and Wilson (1992) also conducted a study that aimed to predict adherence to treatment regimens and sustained control. Eighty-two adult patients had received a diagnosis of diabetes for three months or more, could read, write, and speak English fluently, had no history of psychiatric disorder, nor were

experiencing major physical complications of diabetes. However, only sixty-three adults with an average age of 64 years completed the study (49 males and 14 females). Participants attended two assessment sessions two months apart in which they filled out the self-report instruments.

At the two sessions the patients filled out a general information questionnaire that covered demographic information, time since diagnosis of diabetes, physical complications from diabetes, and the type of diabetes treatment they are currently using. The second piece of information obtained was a self-report self-efficacy scale to rate how confident they were that they could follow their recommended treatment programs over the next eight weeks. Self-efficacy strength was computed by taking average confidence scores within each area. The third piece of information taken was a treatment adherence measure. Patients were asked to report their adherence to the treatment regiment over the previous eight weeks. Patients circled the percentage of occasions that they performed the behavior over the last eight weeks. Patient's glycemic control, the fourth piece of information gathered, was assessed by a blood test taken on the same day as the self-report measures. It provides a measure of average blood concentration of glucose during the previous two months. The final piece of information gathered was the subjects' mood, including tension, depression and anger. These three scales were then averaged together to form a negative mood score.

A stepwise multiple-regression was performed after the number of variables was minimized, using a significance level of .05, to predict the adherence of variables from pre to post. Kavanagh, Gooley, and Wilson (1992) were particularly interested in testing whether adherence at post would be better predicted by pretest assessments of self-

efficacy or by previous adherence attainments. The results of the analysis showed self-efficacy to be significant. The study demonstrated the power of self-efficacy to predict adherence and level of control to diabetes management over an eight-week period and is consistent with Bandura's view that perceived self-efficacy is a good predictor of how well one can adhere to the behaviors that enable them to manage their own health (Bandura, 1997).

Holman and Lorig's (1992) Perceived Self-Efficacy in Self-Management of Chronic Disease discusses the application of Bandura's four principles to strengthen one's personal efficacy for the self-management of chronic disease. The first and most powerful principle is guided mastery. Guided mastery is the breaking down of desired behaviors into small tasks, learning and practicing those behaviors, and receiving feedback that is used for self-corrective adjustments to the behavior. The second principle is social modeling. Social modeling is observing others perform the desired behaviors with the desired outcome. The best type of model used for social modeling is a coping model. This type of model uses a person that has a problem but copes with it day to day and is able to lead an active life. The third principle is social persuasion, urging learners to do a little more than they did the day before. However, raising ones expectations without having any measure of success will result in failure and further lowering of that person's self-efficacy. The final principle used to strengthen one's personal efficacy is reducing aversive physiological reactions. That is, accomplishing the desired behavior without emotional arousal or stress. Self-efficacy has been studied with a variety of health functions. However, little research has been done in the area of asthma self-efficacy.

Existing Asthma Self-Efficacy Scales

Tobin, Wigal, Winder, Holroyd, and Creer (1987) designed the first asthma self-efficacy scale. Forty-eight patients diagnosed with asthma aged 3.5 - 69 years participated in the development of the asthma self-efficacy scale. An open-ended inventory was administered, asking patients to describe at least ten situations in which they might experience an asthma attack. Those items were then shortened into 80 scale items in the areas of activities, interactions, and feelings. Patients were asked to rate their confidence in their ability to cope with a situation using a 5-point Likert scale. The Asthma Self-Efficacy Scale was then administered to 65 patients aged 18 - 75 years. Patients were contacted by mail for their participation in the study. If they agreed to participate, they were mailed the Asthma Self-Efficacy Scale with return postage-paid envelope. Two weeks after the initial survey was returned a second Asthma Self-Efficacy Scale was mailed to obtain test-retest reliability.

The data from the second administration was analyzed using Pearson Product Moment Correlation which produced a correlation of r = .77. A Cronbach's alpha for internal consistency of the questionnaire was also performed. The first administration had an alpha = .97 and the second administration also had an alpha = .97, demonstrating that the scale was reliable and internally consistent (Tobin, Wigal, Winder, Holroyd, and Creer, 1987). However, a limitation of this study, the large age range between the patients, should be noted. The scale was not administered to children under the age of 18.

Scholosser and Havermans (1992) developed an asthma self-efficacy scale for children aged 10-18 years. Sixty children (34 boys and 26 girls), who were hospital

outpatients, had asthma confirmed by their pulmonary physician and had experienced at least one attack a year, were recruited by their pulmonary physician for the study. If parents and children agreed to participate in the study, the researcher contacted them by phone to schedule an interview at the hospital lasting approximately 1.5 hours. The children were assigned to two groups, younger (aged 10-14 years) and older (aged 15-18 years). Scholosser and Havermans self-efficacy scale consisted of 38 items developed from their review of the literature and Grossman, Brink, & Hauser's (1987) self-efficacy scale for diabetes. The asthmatic children were asked to rate different situations on a five-point Likert Scale with one representing, "I am very sure I can do that" and a five representing, "I am very sure I cannot do that." In addition to the Asthma Self-Efficacy Scale, several subscales were reviewed for the development of an Asthma Self-Efficacy Subscale. Included in those subscales were: (a) a Dutch version of the Stait-Trait Anxiety Inventory used to measure stait and trait anxiety, (b) the Asthma Coping Questionnaire for children used to measure the way patients with asthma cope with asthma and asthma attacks in daily life, (c) an abbreviated Dutch version of The Respiratory Illness Opinion Survey (RIOS) used to measure the attitude of the patients towards their asthma, (d) a Knowledge Questionnaire used to measure the patients knowledge concerning their asthma, medication, side effects, etc., and (e) the Dutch Personality Questionnaire/Junior used to measure personality characteristics.

After applying a Varimax rotation to the 38-item Self-Efficacy Scale to check which subscales could be differentiated and which expressions could be deleted, 22 items remained on the subscale questionnaire. The subscale questionnaire could be reduced to eight items focusing on asthma medical treatment, eight items focusing on asthma in

relation to the environment, and the final six items focusing on asthma and problem solving. The reliability of those 22 items was alpha = .87. All 60 patients were administered both the Self-Efficacy Scales and the Self-Efficacy Subscales. In order to obtain a high score for self-efficacy on both the total scale and the subscales the scoring was reversed. The items were added together to obtain one single score. The mean score on the Self-Efficacy Scale was 93.33 (SD 11.63, range 38-190). On the subscale medical treatment, the mean score was 36.55 (SD 8.02, range 8-40), environment mean score was 34.65 (SD 4.56, range 8-40), and the problem solving mean score was 26.17 (SD 3.32, range 6-30). T-tests were performed comparing the mean scores for the younger children and the older children. The older children scored higher on the self-efficacy scale and the 22 subscales. However, a significant difference was noted only on the total Self-Efficacy Scale and the Medical Treatment Subscale. To assess construct validity of the Self-Efficacy Scale and the Self-Efficacy Subscales, scores were correlated with the results of the Asthma Coping Questionnaire for Children, the Optimism and Shame Scales of the RIOS, the Knowledge Questionnaire, the Stait-Trait Anxiety Inventory, and the Dutch Personality Questionnaire. The Self-Efficacy Scale as well as the Self-Efficacy Subscales were reliable, according to a Cronbach alpha of .87, and showed fair homogeneity and factorial validity. However, one limitation to this study is that it is not known if these questionnaires are reliable over time. Unfortunately, this scale is not published nor is it available for distribution.

Future Research Needs Pertaining to Self-Management and Self-Efficacy of Asthma

Researchers have recognized that asthma self-management is a vital component in reducing the number of children that die from asthma and that there are asthma self-

management programs that are proven to work; however, many children do not continue with the programs for a long period of time (Hannaway, 2002). One possible explanation for this is based on ones' asthma self-efficacy regarding asthma self-management. To date, there have only been three research studies that have examined the relationship of asthma self-management knowledge and asthma self-efficacy. One of the studies was administered to adults (Tobin, Wigal, Winder, Holroyd, & Creer, 1987) while the other two were administered to children (Schlosser & Havermans, 1992). However, there has not been a study that examined the relationship of asthma self-management knowledge and asthma self-efficacy to student's school related outcomes. The purpose of this research is to examine the relationship between asthma self-management knowledge and asthma self-efficacy to academic achievement, number of days absent from school, and number of visits to the school nurse for an asthma related behavior.

CHAPTER III

METHODOLOGY

The purpose of this chapter is to provide an explanation of the methods and procedures that were used in this study.

Sample

The respondents included in this study were students sampled from one public school district within a suburban city in the southwest portion of the United States. Parents were asked to complete a student/parent descriptive demographic survey to provide the necessary student background information, as well as a way to verify student's answers regarding asthma history. Thirty-three males (73.3%) and twelve females (26.7%) ranging in age from five to eleven years of age participated in the study. Participants included two sets of twins, with each set consisting of on child of each gender. Eric Gershwin (1997) reported that in early childhood, asthma is more severe and more common in males.

Demographics

The public school district selected for the sample had an enrollment of 11,150 children during the 2002-2003 school year. Of those enrolled in the district, the ethnic composition was 72.5 % white, 13.2% Hispanic, 7.8% African American, 7.8% Asian/Pacific Islander, and 1% Native American/Alaskan Native. Representative of the district, the majority of participants in the study were white. The ethnicity of participants in the study can be seen in Table 1.

Table 1
Ethnic Composition of Participants

Race	Frequency	Percent
White	36	80.0
Black	6	13.3
Native American	1	2.2
Hispanic	1	2.2
Other	1	2.2
Total	45	100.0

Child's Asthma Background

More than half of the children participating in this study were diagnosed with asthma between the ages of one and five (see Table 2). None were diagnosed after the age of ten. Age of diagnosis is consistent with demographic studies of children and asthma; most children are diagnosed between the ages of two and five (Hannaway, 2002; Gershwin, 1997).

Table 2
Age at Time of Diagnosis

Age of diagnosis	Frequency	Percent
Birth-1 years old	12	26.7
1-5 years old	22	48.9
5-10 years old	11	24.4
11-13 years old	0	0.0
Total	45	100.0

At the time of their child's diagnosis, 48 parents participating in the study reported that they were given information about the symptoms of asthma and how to take asthma medications. Some parents did report receiving information about asthma the disease (n = 21), asthma triggers (n = 19), asthma medications (n = 17), and asthma inhalers (n = 16). Four parents reported receiving no information about asthma and only six parents reported receiving all the information at the time of their child's diagnosis. (see Table 3).

Table 3
Information Given to Parents at the Time of Child's Diagnosis

Information given	Frequency	Percent
No information given	4	8.88
Asthma, the disease	21	46.6
Asthma triggers	19	42.2
Asthma symptoms	24	53.3
Asthma medications	17	37.7
Taking asthma medication	24	53.3
Peak flow meters	10	22.2
Asthma inhalers	16	35.5
Asthma self-management	4	8.88
All information given	6	13.3

Note. Percentages do not add up to 100% due to the fact that parents may have been presented with multiple types of information at the time of child's diagnosis.

Only four parents reported receiving any information about self-management from their physician. When parents were asked if their child self-managed their asthma at home and/or at school 18 parents reported that their child does self-manage their asthma at home and 14 parents reported that their child does self-manage their asthma at school (see Table 4). Parents also reported that their child practiced self-management by asking to go to the school nurse for their inhaler or by telling their parents that they needed their asthma medication. Only one parent reported that their child is allowed to carry their inhaler with them at all times during the day.

The American Academy of Allergy, Asthma & Immunology (2000) published a position statement that encourages schools to allow responsible students of any age to keep inhalers in their possession and assume responsibility for self-management of their asthma. The public school district's policy on medication, used in this research, is that all medication must be stored in the school clinic with the exception of asthma medication. Students can possess and self-administer asthma medicine while on school property if the

school nurse receives a written authorization statement from both the student's parent and the student's doctor.

Table 4
Parents Reporting that Students Self-Manage their Asthma at Home and at School

Setting	Reporting self-management			
	No		Yes	
	Frequency	Percent	Frequency	Percent
Home	27	60.0	18	40.0
School	31	68.9	14	31.1

Table 5 shows that twenty-seven percent (n = 12) of the children participating in the study were taking at least three different asthma medications and eleven percent (n = 5) were taking no medication at all.

Table 5
Number of Asthma Medications Taken

Number of medications	Frequency	Percent
None	5	11.1
One	7	15.6
Two	9	20.0
Three	12	26.7
Four	5	11.1
Five	6	13.3
Six	1	2.2
Total	45	100.0

Over forty percent of the parents (n = 20) reported that their child never used a peak flow meter to monitor the onset of an asthma attack (see Table 6). Although fifty percent of the parents noted that their child used a peak flow meter at some time, one parent said that the peak flow meter would not indicate an asthma attack. Two parents said that they didn't even own a peak flow meter and one parent said they did not know what a peak flow meter was. Four parents reported that they only used a peak flow meter on their child if their child was in distress. Again, only ten parents reported receiving any

information from their physician about a peak flow meter at the time of their child's diagnosis.

Table 6
Peak Flow Meter Use Among Participants

Use peak flow meter	Frequency	Percent
Daily	8	17.8
Twice a Week	0	0.00
Once a Week	1	2.2
Once a Month	9	20.0
Twice a Year	6	13.3
Yearly	1	2.2
Never	20	44.4
Total	45	100.0

Educational Background

The educational background of the participants includes grade level and achievement scores. The grade level frequency and percent distribution can be seen in Table 7. The majority of participants were in the third grade and the least number of participants were in fifth grade.

Table 7
Grade Level of Participants

Grade	Frequency	Percent
Kindergarten	4	8.9
1st Grade	6	13.3
2nd Grade	9	20.0
3rd Grade	14	31.1
4th Grade	9	20.0
5th Grade	3	6.7
Total	45	100.0

In an effort to describe the achievement characteristics of the sample, achievements scores were gathered as seen in Tables 8 and 9. Achievement scores were not used for comparison within the sample, but rather to further describe the achievement of the sample. A number of different grade level achievement tests were used in the schools. The researcher calculated an average and range of the subjects' scores for each

grade level test given, with the exception of the TAKS, which was reported in a pass/fail format. Seven students participating in the study did not have scores to report due to the fact that they were absent, exempt from that test, or their information was not available because they just moved into the district.

Table 8
Grade Level Achievement Tests Results

Grade	Instruments and score gathered	Average	Range
Kinder n=4	Boehm Test of Basic Skills (BOEHM): Percentile Rank Score	44.8	43-46
1st Grade n=8	Iowa Cognitive Abilities Test (CoGAT): Composite Percentile Rank Score	62.5	32-97
2nd Grade n=9	Iowa Test of Basic Skills (ITBS): National Percentile Rank on the Core Total Score	58.0	11-97
3rd Grade	State Level Assessment (TAAS): Texas Learning Index (TLI) TAAS Reading (n=7) TAAS Math (n=7)	 91.4 89.3	 86-94 84-93
4th Grade	State Level Assessment (TAAS): Texas Learning Index (TLI) TAAS Reading (n=4) TAAS Math (n=4) TAAS Writing (scaled score average) (n=3)	 97.5 90.8 2,116.7	 96-98 89-93 1670-2350
5th Grade n=1	State Level Assessment (TAAS): Texas Learning Index (TLI) TAAS Reading TAAS Math	 100.0 90.0	

In the 2001-2002 school year 3rd-5th graders were given the Texas Assessment of Academic Skills (TAAS). However, in the 2002-2003 school year Texas developed a new assessment program for 3rd-5th graders that was more aligned with the state curriculum called the Texas Assessment of Knowledge and Skills (TAKS). Table 9 shows the number of students participating in the study who took the TAKS as well as the number of students who passed.

Table 9
TAKS Grade Level Achievement Tests Results

Grade	Instruments and score gathered	Pass	Fail
3rd Grade	State Level Assessment (TAKS):		
	TAKS Reading (n=7)	7	0
	TAKS Math (n=5)	5	0
4th Grade	State Level Assessment (TAKS):		
	TAKS Reading (n=4)	4	0
	TAKS Math (n=5)	5	0
	TAKS Writing (n=3)	3	0
5th Grade	State Level Assessment (TAKS):		
	TAKS Reading (n=2)	2	0
	TAKS Math (n=2)	2	0

As seen in Table 9, all of the participants passed the TAKS test. Overall, students who participated in the study performed at an average to above average level on their achievement tests.

Instrumentation

Three data collection instruments were developed for this study. The questions in the instruments were developed as an extension of the original Open Airways study conducted by Evans, Clark, Feldman, Rips, Kaplan, Levison, et al. (1987b). Data were gathered during a face-to-face interview with each participant using the Asthma Student Self-Management Knowledge in a School Setting Survey (see Appendix 1) and the Asthma Self-Efficacy of Self-Management of Asthma Survey (see Appendix 2). The parents completed the Student/Parent Demographic Survey (see Appendix 3).

Asthma Student Self-Management Knowledge in a School Setting Survey

The Asthma Student Self-Management Knowledge in a School Setting Survey (SMS) was developed by the researcher based on a review of the six lesson topics of Open Airways (American Lung Association, 1998). The survey determined the extent of the student's knowledge of asthma self-management behaviors. The SMS consisted of 22

questions (see Appendix 1). Each item directly reflected one of the six lesson topics of the American Lung Associations Open Airways (American Lung Association, 1998), describing one's knowledge of asthma self-management behaviors. The mean for the SMS was 9.9 and the standard deviation was 3.6. Table 10 shows the correlation between the Open Airways curriculum and the SMS.

Table 10
Alignment of Open Airways and SMS and AMES

Open Airways Lesson	SMS and AMES correlating question
Basic information/feelings about asthma	1, 2, 3, 4, 6
Recognizing and managing asthma symptoms	5, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19
Solving problems with medicines/deciding how bad symptoms are	8, 9, 20, 21
Finding and controlling asthma triggers	4
Keeping your battery charged: How to get enough exercise	6, 7
Doing well in school	22

The questions in the SMS were presented in a yes/no format with a follow-up open-ended explanatory response. In order for students' responses to be evaluated as correct, both their open-ended response and their open-ended explanation had to be deemed correct, as evaluated by the researcher. McNamara (1994) stated that it is best practice to combine both open and close-ended questions when designing a survey for research purposes. By using the close-ended question for statistical procedures and then following it up with an open-ended question, one may show why the participant responded in such a way. In terms of internal consistency, the SMS has a Cronbach

Alpha of .72 which represents the reliability with which the SMS measures asthma student self-management knowledge in a school setting.

Asthma Self-Efficacy of Self-Management of Asthma Survey

The researcher also designed the Asthma Self-Efficacy of Self-Management of Asthma Survey (AMES), which contained the same 22 items (see Appendix 2) that were in the SMS. Each item directly reflected one of the six lesson topics of the American Lung Associations Open Airways (American Lung Association, 1998); describing how confident one was in performing an asthma self-management behavior (see Table 10). The AMES used a four-response category Likert scale with one being "not at all confident" and four being "completely confident". Completely confident on the scale, a rating of four indicated that the student felt completely confident in the specific asthma self-management knowledge or skill. The mean score for the AMES was 58.0 and the standard deviation was 12.0. In terms of internal consistency, the AMES has a Cronbach Alpha of .84, which represents the reliability with which the AMES measures asthma self-efficacy of self-management of asthma.

Student Outcome Indicators

Student outcome data included information on reading grades, attendance, and the number of times the child visited the school nurse for asthma related behavior during the second nine week period of October 14 to December 20, 2002 with a school holiday for Columbus Day and one week off for Thanksgiving. The second set of data were collected during the second nine week period from October 13 to December 19, 2003 with a school holiday for Columbus Day and one week off for Thanksgiving. Student outcome indicators were gathered concurrent with the time frame in which the interviews

took place from eight elementary schools within the public school district. All data were collected following the child's completion of the AMES and SMS.

Recent Reading Grades of Sample

After the interviews were conducted, the researcher contacted the school data clerks to provide a record of each student's reading grade for the nine-week period concurrent with the interview date. Student's reading grades for the nine-week grading period were used as an outcome indicator of current student achievement.

Table 11 shows that 75.6% of participants scored in the A range on reading grades. On a scale of 100, a reading grade of A ranges from 100% to 90%, a B ranges from 89% to 80%, a reading grade of a C ranges from 79% to 70%, and anything below 70% is considered failing. One should note that grades Kindergarten and first report using an S (skill development meets expected level), P (skill development progressing), and a U (skill development below expected level) system. For these two grade levels, a reading grade of S ranges from 100% to 90%, a P ranges from 89% to 70%, and a U ranges from 70% and below. All Kindergarten and first graders participating in the study received an S reading grade on their report cards which is comparable to the percentage as an A.

Table 11
Reading Grades of Participants

Reading grades	Frequency	Percent
A (includes K and 1st graders)	34	75.6
B	8	17.8
C	3	6.7
Total	45	100.0

Attendance

Prior to conducting student interviews, the researcher met with the school data clerks (n = 8) to present the study and to ask for their assistance. Once the interviews with the students were conducted, the researcher contacted the school data clerks to provide the specific nine weeks school attendance that was concurrent with the time of the interview, for each student participating in the study. The number of days absent was counted and recorded.

Although 75% percent of the parents participating in the study reported that their children were never absent from school due to asthma, the school data clerk reported (see Table 12) that over 50% of children participating in this study were absent one to two days from school. Asthma is the leading cause for school absenteeism. Children absent from school, due to asthma, are usually absent more frequently, but only for a brief period of time, which can be more harmful academically then the occasional long absence (Richards, 1986).

Table 12
Number of Days Absent from School

Number of days absent	Frequency	Percent
0	7	15.6
1	11	24.4
2	12	26.7
3	5	11.1
4	4	8.9
5	2	4.4
6	2	4.4
7	2	4.4
Total	45	100.0

Number of Visits to School Nurse

After the interviews were conducted, the researcher contacted the school nurses (n = 8) to provide record of the number of times each student participating in the study

visited the school nurse for an asthma related behavior. To gather information that was concurrent with the interview, the researcher provided the school nurses with the specific nine-week period in which the interview took place. Number of visits were counted and recorded.

Parents (n = 39) reported that their children participating in the study takes between two and five different medications on a daily basis, parents (n = 35) also reported that rarely, if ever do their children go to the school nurse for an asthma related behavior, including receiving their asthma medications. However, the school nurses reported that only nine of the children participating in the study have never visited the school nurse for an asthma related behavior (see Table 13).

Table 13
Number of Visits to the School Nurse for an Asthma Related Behavior

Visits to school nurse	Frequency	Percent
0	9	20.0
1	13	28.9
2	6	13.3
3	3	6.7
4	3	6.7
5	3	6.7
6	1	2.2
7	3	6.7
8	4	8.9
Total	45	100.0

Procedures

Following approval by the Texas A&M University Human Subjects Institutional Review Board Committee, the researcher met with the local school district's central administrators, school principals and head school nurse to get their consent to conduct the study in their district. Once consent was obtained, the researcher met with the school

nurses to discuss the purpose and procedures of the study and to ask for their support in the study.

The researcher provided the local independent school district nurses with a stamped envelope containing a cover letter stating the purpose and procedures of the study and asking for participants in the study. In addition, a self-addressed stamped response card for parents was provided. School nurses applied address labels to the envelopes and mailed them to the parents of children aged 5-12 years in grades Kindergarten through fifth grade who had been diagnosed with asthma. In addition, the researcher provided each child in the district, in grades Kindergarten through fifth grade, a copy of the cover letter and response card, which went home in Thursday folders. The local independent school district sends home parental information in a folder every Thursday. The researcher also informed potential participants at five Parent Teacher Association meetings, putting a synopsis about the study in the district newsletter, and by word of mouth.

Once the researcher received the return response card showing the parent's interest in participating in the study, the researcher then mailed the parents consent and assent forms (see Appendix D), the student/parent demographic survey (see Appendix C), and a self-addressed stamped return envelope. The participating parents and students filled out the forms and then mailed them back to the researcher. When consent and assent were obtained, the researcher scheduled an interview date and time with each student at his/her school. The researcher interviewed each student individually using the AMES and the SMS. In order to ensure that student reading levels would not influence

responses and that participants questions regarding survey items would be clarified, the researcher read aloud the AMES and SMS to each of the participants and clarified.

Each interview lasted approximately 10-15 minutes in length. Once the interview was completed, the researcher contacted the school data clerks, counselors, and nurses to gather information on student outcome indicators. The clerks, counselors and nurses were each provided student outcome grids (see Appendix E) to fill in the necessary information on each participant: grades, attendance, achievement scores, and number of times visited school nurse for an asthma related behavior. The grid was used for ease and to ensure that all information was gathered on each participant. When the grid was completed, the clerks, counselors, and nurses returned the grid to the researcher. Twenty-three respondents provided consent and assent to participate in the study through this initial request during the second nine week period of October 14 to December 20, 2002.

In an effort to seek additional participants, the researcher met again with the central administration to share the results of the study to date and to seek approval for a second attempt at going through mail outs and presentations at Parent Teacher Association meetings. The assistant superintendent suggested contacting those schools that had the best response rate last time, as well as those schools with a new school nurse. Five school nurses were contacted. Four responded and said that they were interested in helping. The researcher met with the four school nurses to share the results to date, to provide each nurse with the same recruitment letters with stamped envelopes and stamped response cards, and to share the names of those students already participating in the study. The school nurses addressed the envelopes to those children, aged 5-12 years in grades Kindergarten through fifth, which have been diagnosed with asthma and are not

currently participating in the study. In addition, the researcher again attended three Parent Teacher Association meetings and put a letter in the school newspaper. As a result, another 22 parents and students provided consent and assent to participate in the study during the second collection from October 13 to December 19, 2003.

School district administrators reported that there were more than 400 students diagnosed with asthma in the public school district. Due to the efforts to maintain confidentiality of possible participants, the researcher was unable to identify who was sent response cards by the school nurses. Of those response cards received by the researcher, 28 out of the 34 provided consent and assent to participate in the study. The other 17 participants were recruited by the researcher at PTA meetings or by word of mouth.

CHAPTER IV

RESULTS

The major purposes of this study were to examine the relationship of self-efficacy regarding self-management of asthma and student self-management knowledge and also examine the extent to which self-efficacy and self-management knowledge predicts student outcomes.

The purpose of this chapter is to present quantitative analyses performed on the data received through one-on-one interviews with children who have been diagnosed with asthma. The statistical analysis and interpretation for each question will be presented separately.

Research Question One

Is self-efficacy of self-management of asthma (AMES) related to student self-management knowledge of asthma in a school setting (SMS)?

To better understand the pattern of relationships between the AMES and the SMS, a Pearson Product Moment Correlation Coefficient (Pearson r) was used in the regression analysis. Of the two variables, one is referred to as the predictor or the variable that precedes the criterion variable. The criterion variable is the variable that the researcher is interested in explaining, predicting, or better understanding (Daniel & Onwuegbuzie, 2001). In this study, the self-efficacy score on the AMES was the predictor variable, and the self-management knowledge score on the SMS was the criterion variable.

The Pearson r value is used to show the strength and directionality of the relationship between the AMES and the SMS. A correlation does not imply causation,

but rather knowledge of how one allows for the prediction of occurrence of the other variable (Sprinthall, 2000).

Both the asthma student self-management knowledge in a school setting survey (SMS) and the asthma self-efficacy of self-management of asthma survey (AMES) were given and a separate total score was calculated by adding each of the individual item ratings as indicated by the participant's responses as seen in Tables 14 and 15. The possible range of AMES scores were 22 to 88. The possible range of SMS scores were 0 to 22.

As evident from Table 14, one participant's total score for the AMES was 22, indicating that he or she is not at all confident about his or her asthma self-efficacy of self-management knowledge. The highest cumulative total was 81 indicating a very strong confidence about asthma self-efficacy of self-management knowledge. The mean for the AMES total scores was 58 and the standard deviation was 12.07.

Table 14
Frequency Distribution of AMES Total Scores

Total scores	Frequency	Percent	Cumulative percent
22.00	1	2.2	2.2
32.00	1	2.2	4.4
37.00	1	2.2	6.7
46.00	2	4.4	11.1
47.00	1	2.2	13.3
48.00	1	2.2	15.6
49.00	2	4.4	20.0
50.00	2	4.4	24.4
51.00	1	2.2	26.7
52.00	2	4.4	31.1
53.00	2	4.4	35.6
54.00	3	6.7	42.2
56.00	1	2.2	44.4
57.00	1	2.2	46.7
58.00	3	6.7	53.3
59.00	2	4.4	57.8
60.00	1	2.2	60.0
61.00	1	2.2	62.2
62.00	1	2.2	64.4
63.00	3	6.7	71.1
64.00	2	4.4	75.6
66.00	2	4.4	80.0
69.00	1	2.2	82.2
70.00	1	2.2	84.4
72.00	1	2.2	86.7
73.00	1	2.2	88.9
75.00	1	2.2	91.1
76.00	1	2.2	93.3
78.00	1	2.2	95.6
79.00	1	2.2	97.8
81.00	1	2.2	100.0
Total	45	100.0	

Figure 1 shows a histogram of the frequency distribution of the total scores for the AMES along with the standard deviation and the mean. This frequency distribution helps to provide a visual inspection of the AMES score frequencies and to review issues related to normality. There is a slight pull of the distributions tail to the left, indicating a slight negative skew, but not enough to cause a problem with normality.

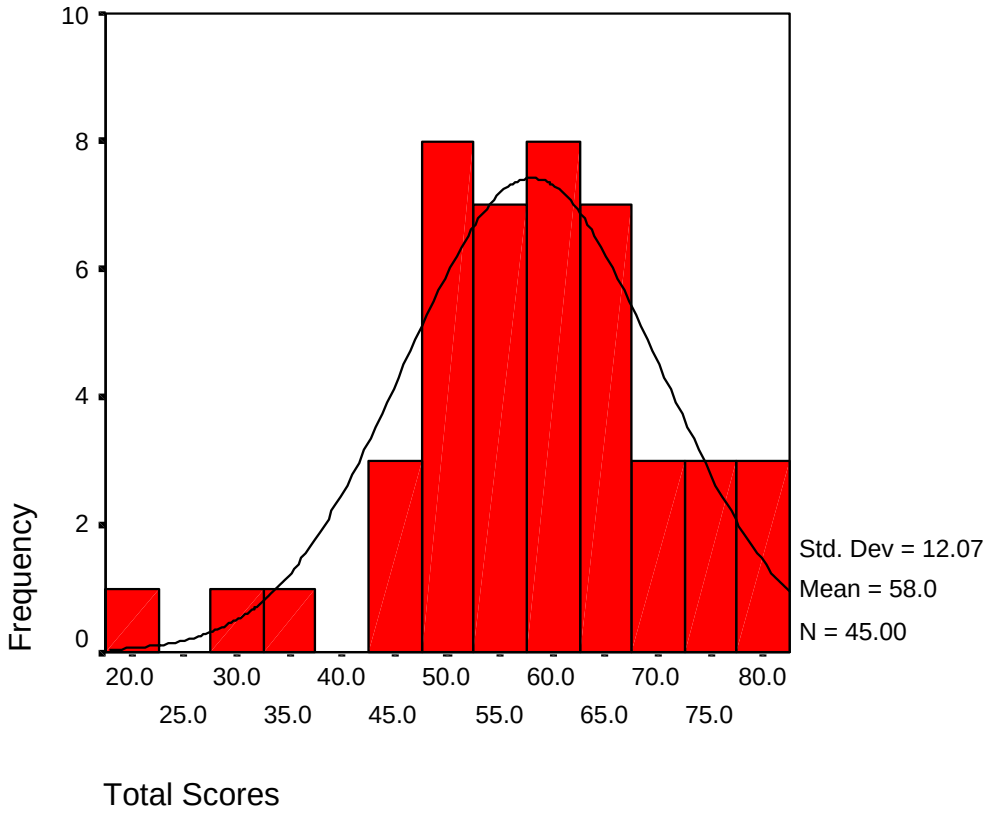

Figure 1. Histogram, standard deviation, and mean of the AMES total scores.

Similarly Table 15, total scores for the SMS, indicates that one participant has knowledge about one item related to asthma self-management in a school setting. The mean for the SMS total scores was 9.9 and the standard deviation was 3.61.

Table 15
Frequency Distribution of SMS Total Scores

Total scores	Frequency	Percent	Cumulative percent
1.00	1	2.2	2.2
3.00	1	2.2	4.4
4.00	2	4.4	8.9
6.00	3	6.7	15.6
7.00	3	6.7	22.2
8.00	7	15.6	37.8
9.00	3	6.7	44.4
10.00	6	13.3	57.8
11.00	4	8.9	66.7
12.00	3	6.7	73.3
13.00	3	6.7	80.0
14.00	4	8.9	88.9
15.00	3	6.7	95.6
16.00	1	2.2	97.8
17.00	1	2.2	100.0
Total	45	100.0	

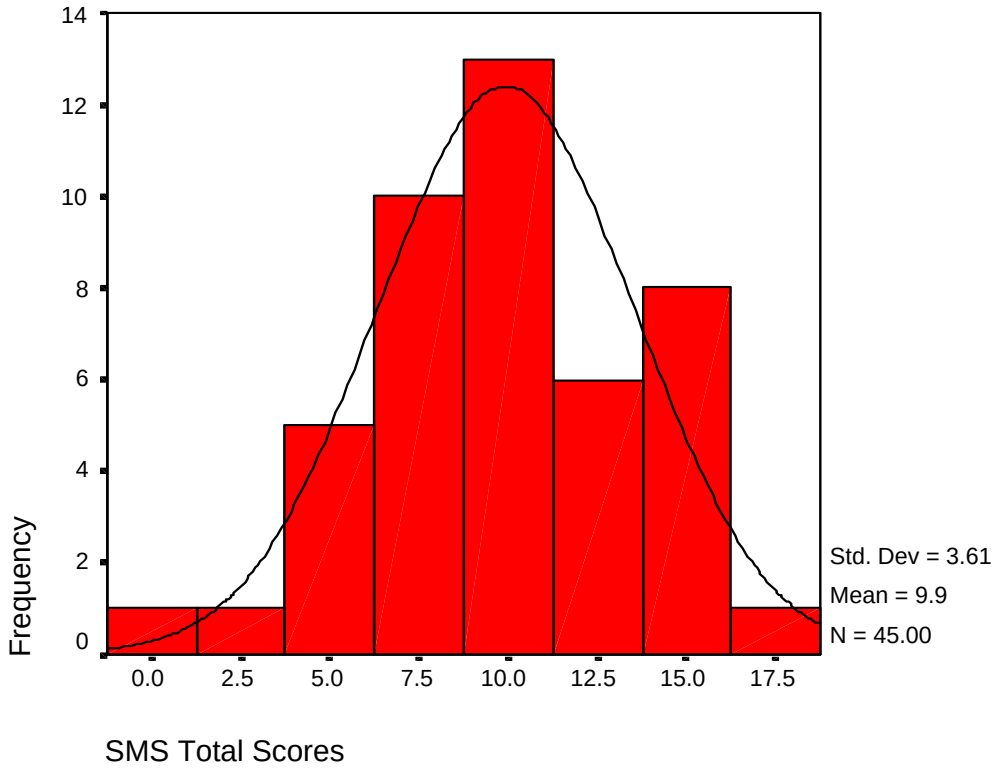

Figure 2. Histogram, standard deviation, and mean of the SMS total scores.

Figure 2 shows a histogram of the frequency distribution of the total scores for the SMS along with the standard deviation and the mean. There is also a slight negative skew in the frequency distribution, but nothing that would cause concern for a violation of normality.

The findings of the Pearson Product Moment Correlation Coefficient showed that there was a statistically significant positive relationship between the SMS and the AMES total scores at the .01 level ($r = .458$). To better understand the correlation coefficient of .458 one can square the Pearson r correlation coefficient to provide the coefficient of determination. The coefficient of determination is used to establish the proportion of the variability among the Y scores that can be accounted for by the variability among the X

scores. The coefficient can then be multiplied by 100 to get a percentage. The coefficient of determination for AMES to SMS is .21 or 21%. In other words, 21% of the variance of the AMES is associated with the variance contained in the SMS. The significant correlation between the AMES and the SMS could detract from their ability to predict accurately.

Research Question Two

Does self-efficacy of asthma self-management and asthma self- management knowledge predict reading grades, school attendance, and the number of visits to the school nurse?

The standard deviation, mean, and range for the three dependent measures: reading scores, days absent, and number of visits to the school nurse can be seen in Table 16.

Table 16
Descriptive Statistics

Dependent measure	Standard deviation	Mean	Range
Reading Grades	.60	1.31	1-3
Days Absent	1.89	2.3	0-7
Visits to School Nurse	2.64	2.7	0-8

To determine if the AMES and the SMS could predict reading grades, the number of times a student was absent, and the number of visits a student made to the school nurse, a multiple linear regression model was used. A multiple linear regression model allows the researcher to look simultaneously at the predictor variables and to examine the collective ability of those variables to predict the criterion variables (Daniel & Onwuegbuzie, 2001). The term prediction means the ability to estimate scores on the criterion variable based on the knowledge of scores of the predictor variable. The

criterion variables for the equation were the students' reading grades, number of days absent, and number of visits to the school nurse. The total scores of the AMES and the SMS were used as predictor variables. The predictor variables were combined in the equation. The formula for the regression equation (Hinkle, Wiersma, & Jurs, 1998) is as follows:

$$\hat{Y} = \beta_1 X_1 + \beta_2 X_2$$

where

$\hat{Y}$ = predicted scores for student reading grades, number of days absent, and number of visits to the school nurse

β_1 = the regression weight for the AMES score

X_1 = total score of the AMES

β_2 = the regression weight for the SMS score

X_2 = total score of the SMS

In a multiple regression analysis, the multiple correlation coefficient (R) generally assumes the characteristics of a Pearson Product-Moment Correlation Coefficient, except that it takes only the positive values from 0.0 to 1.0 (Hinkle, Wiersma, & Jurs, 1998). The square of the multiple correlation coefficient (R^2) is interpreted in the same way as the square of the bivariate correlation coefficient (r^2). That is, R^2 is the proportion of the variation in the criterion variable that can be attributed to the variation of the combined predictor variables (Hinkle, Wiersma, & Jurs, 1998).

Dependent Measure Reading Grades

The significance value was .07, indicating no statistical significance, assuming an alpha level of .05, or the risk that a researcher is willing to take in rejecting the stated null

hypothesis when it is actually true within the underlying population. In other words, the combined AMES and SMS scores add nothing to prediction of a student's reading grade.

When the multiple regression was performed for the dependent variable reading grades, the R^2 value was .119 or 12%. In other words, 12% of the variance in reading grades can be attributed to the variation of the combined AMES and SMS. Due to the fact that students were not randomly selected, one would be cautious to generalize these findings to other children with asthma in other samples. The sample in this study is essentially a convenience sample and may not really be representative of other samples. However, there is minimal evidence showing that reading scores maybe predicted by asthma self-efficacy and asthma self-management knowledge within this sample.

Table 17
Reading Multiple Regression

Independent variables	Beta weights	Sig.	Multiple R	Multiple R^2	F
			.345	.119	2.84
SMSTOT	.357	.034			
AMESTOT	-.298	.074			

However, to better understand the reading regression score, the researcher analyzed the standardized regression coefficients or beta coefficients. This transforming of raw scores to standard scores and comparing the two absolute values allows for a better interpretation of scores. Of the two surveys used in the regression model, the SMS has a beta weight of .357 compared to the AMES beta weight of .298. The beta weights also tell us how much change can be expected in the independent variable when there is a change in the dependent variable. The relationship among the two independent variables

and the dependent variable suggest a positive relationship between the SMSTOT and reading and a negative relationship between AMESTOT and reading.

In examining the scatterplot for the standardized residual and the standardized predicted values for reading (Figure 3), one could determine if the assumptions for the multiple regression procedure were met. The pattern of the dots in this scatterplot needs to be evenly distributed both above and below the line that goes through the zero point. Reading grades were assigned a number for each letter grade (1 = A, 2 = B, 3 = C). Because these are ordinal variables, one can see that the funnel pattern in the distribution is an indicator that the assumption of homoscedasticity has been violated, which could affect the standard error values used to determine test statistics and confidence intervals. Therefore, the risk of incorrectly rejecting the null is increased.

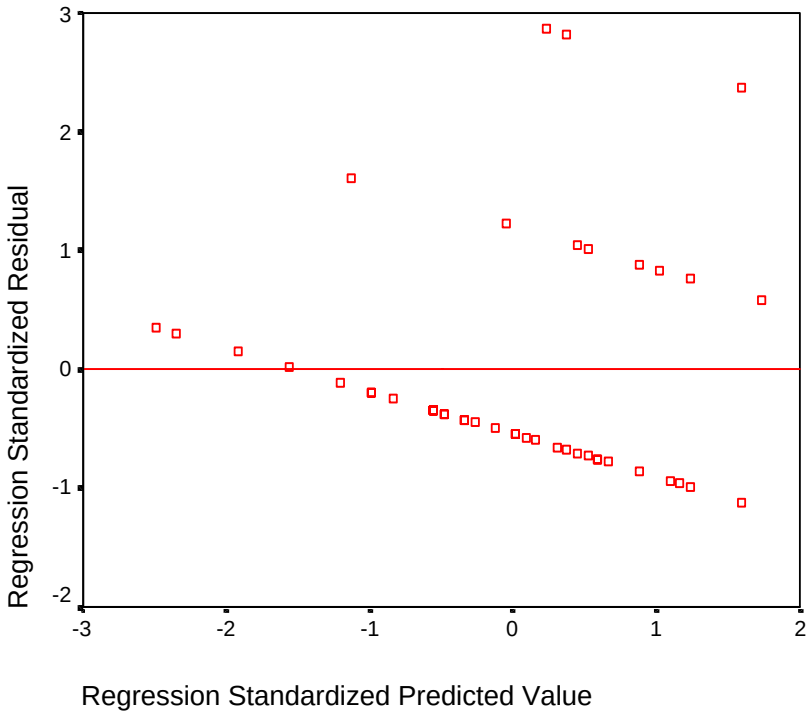

Figure 3. Scatterplot for the dependent variable reading.

Dependent Measure Days Absent

When the second multiple regression was performed for the dependent variable number of days absent, the R^2 value was .006. Essentially, one could not explain any variance in the dependent variable, number of days absent, with the information gathered from the two independent variables (AMES and SMS). Table 18 shows the reported beta weights, significance, variance accounted for and the F value for the days absent multiple regression.

Table 18
Days Absent Multiple Regression

Independent variables	Beta weights	Sig.	Multiple R	Multiple R^2	F
			.081	.006	.137
SMSTOT	-.055	.753			
AMESTOT	.089	.609			

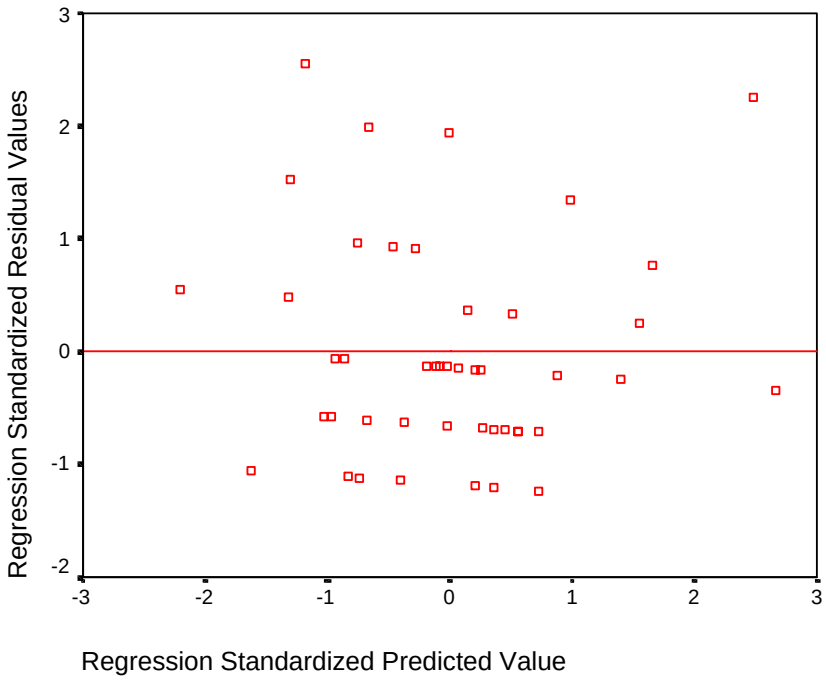

Figure 4. Scatterplot for the dependent variable number of days absent.

Dependent Measure Visits to School Nurse

When the third regression was performed for the dependent variable number of visits to the school nurse for an asthma related behavior, the R^2 value was .007. Again, one could not explain substantial variance in the dependent variable, number of visits to the school nurse, with the information gathered from the two independent variables (AMES and SMS). Table 19 shows the reported beta weights, significance, variance accounted for and the F value for the days absent multiple regression.

Table 19
Visits to School Nurse Multiple Regression

Independent variables	Beta weights	Sig.	Multiple R	Multiple R^2	F
			.081	.007	.139
SMSTOT	-.089	.609			
AMESTOT	.023	.896			

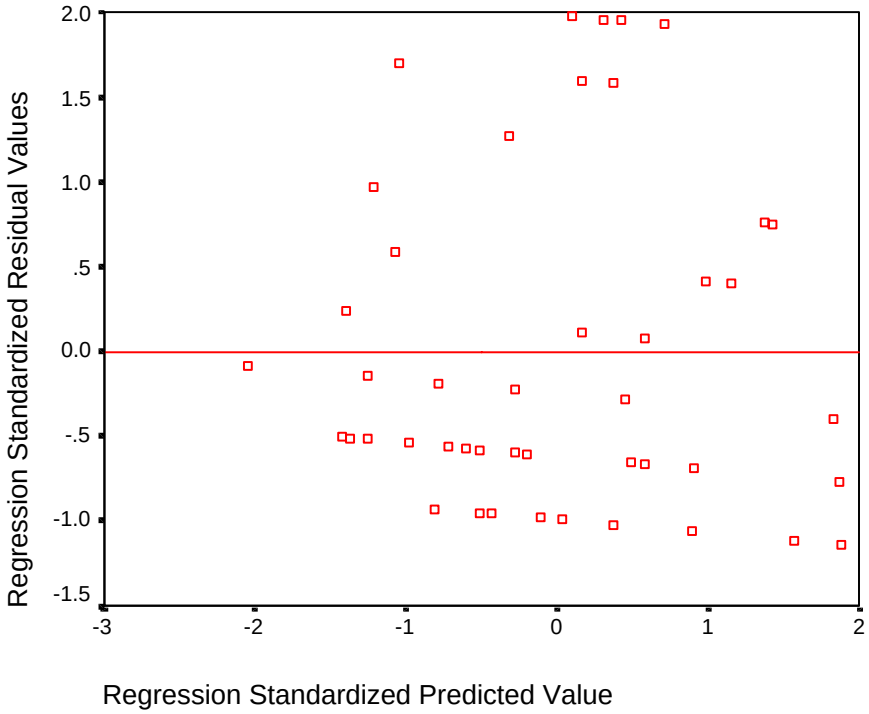

Figure 5. Scatterplot for the dependent variable number of visits to the school nurse for an asthma related behavior.

As evident from Figures 4 and 5, the general shapes of the scatterplots are rectangular in shape. The data points cluster around the centerline indicating that the assumptions for normality, linearity, and homoscedasticity have been met. Although scatterplots indicating a bivariate relationship are usually desired, assessing the assumptions for a regression analysis warrant no observable relationship patterns or trends.

Summary

In summary, question one asked is self-efficacy of self-management of asthma (AMES) related to student self-management knowledge of asthma in a school setting (SMS)? The researcher chose to run a Pearson Product Moment Correlation Coefficient since it examines the degree of association between two variables. The researcher found

that the asthma self-management knowledge in a school setting survey (SMS) and the asthma self-efficacy of self-management of asthma survey (AMES) proved to have a statistically significant positive relationship.

Question two asked does self-efficacy of asthma self-management and asthma self- management knowledge predict reading grades, school attendance, and the number of visits to the school nurse? The researcher chose to run a multiple linear regression because a multiple linear regression model allows the researcher to look simultaneously at the predictor variables and to examine the collective ability of those variables to predict the criterion variables. Out of all the criterion variables, the SMS and AMES were more likely to predict reading scores than number of days absent and number of visits to the school nurse.

Again since the SMS and the AMES were highly correlated, one would be cautious in generalizing these findings to children in the same sample. Table 20 shows the overall finding for research question two.

Table 20
Overall Results of Criterion Variables

Criterion	Predictors	Multiple R	R^2
Reading Grades	AMES & SMS	.345	.119
Days Absent	AMES & SMS	.081	.006
Visits to School Nurse	AMES & SMS	.081	.007

Post Hoc Studies

To further examine the research data, the researcher performed a series of post hoc studies. To examine if Kindergarten through second grade differed from third through fifth grade on the dependent reading variable, the researcher ran a nonparametric test and found that there was no significant difference between the two groups. The

researcher also conducted a step-wise regression analysis to further examine the ability that grade level, AMES and SMS had in predicting reading grades. In this stepwise regression model, the independent variables (grade level, AMES and SMS) are added one at a time if they meet the entry value set by the researcher. The independent variables may also be deleted at any step where they no longer contribute to the regression, again as determined by the statistical criteria established by the researcher. Values for this equation were set liberally to allow for all the variables to enter the equation (entry = .15 and removal = .20). However, when the regression was run, the independent variable grade level did not make it into the equation. Therefore, the results of the regression did not reveal any new information about our data. Table 21 below shows the r and R^2 values for the independent variables which met the criteria set for the regression.

Table 21
Post-Hoc Regression

Independent Variables	r	R^2
SMS	.221	.049
SMS and AMES	.345	.119

CHAPTER V

DISCUSSION AND SUMMARY

The major purposes of this study were to examine the relationship of self-efficacy regarding self-management of asthma and student self-management knowledge and also to examine the extent to which self-efficacy and self-management knowledge predicts student outcomes. Data were gathered through two instruments: the Asthma Student Self-Management Knowledge in a School Setting Survey (SMS) and the Asthma Self-Efficacy of Self-Management of Asthma Survey (AMES). Although the language was modified from the Open Airways program, the researcher found that the SMS and AMES were not modified enough and may have hampered understanding during the interviews.

Data analysis for this study showed that while there was a moderate correlation between the relationship of self-efficacy and self-management knowledge of asthma, there was little to no correlation of self-efficacy and self-management knowledge of asthma to predict student outcomes of reading grades, number of days absent, and number of visits to the school nurse. Possible reasons for these findings are discussed below.

Research Question One

Is self-efficacy of self-management of asthma (AMES) related to student self-management knowledge of asthma in a school setting (SMS)?

Both surveys used in the research proved to be reliable and internally consistent with an alpha of .72 for the SMS and an alpha of .84 for the AMES. The findings of the Pearson Product Moment Correlation Coefficient show that there was a statistically significant positive relationship between the SMS and the AMES ($r = .458$). These

results suggest that one's knowledge to self-manage his or her asthma is related to his or her asthma self-efficacy of asthma self-management. Asthma self-management educational programs were developed for several reasons, some of which were to reduce the impact that asthma had on families and to teach children, through cooperation with their physicians, to accept greater responsibility for the management of their asthma (Wigal, Creer, Kotses, & Lewis, 1990). It is believed that children who participate in asthma self-management programs learn more about their asthma and feel better about their capability to manage their own symptoms (Persaud, Barnett, Weller, Baldwin, Niebuhr, & McCormick, 1996). Holman and Lorig (1992) stated that in order for patients to engage in effective self-management, a couple of preconditions were important; included in those were the understanding of the self-management activity and the development of skills and confidence on the part of the patient. This being a matter of learning, practicing, and evaluating ones personal benefits derived from particular self-management practices. Parcel, Nader, and Tierman (1980) found that children attending their school-based asthma management program "Teaching Myself about Asthma" showed an increase in knowledge about asthma and a feeling of control over their asthma. Similarly, Schlosser and Havermans (1992) found that when comparing asthma knowledge and self-efficacy of children between the ages of ten and eighteen, children who had a higher self-efficacy had better knowledge of coping skills and medication use. These children exhibited a more rational reaction during an attack and displayed better problem-solving skills. Wigal, Stout, Brandon, Winder, McConnaughy, Creer, et al. (1993), found that knowledge, self-efficacy, and attitude were the three variables that were correlated with better control of one's asthma. The three variables interacted to

contribute to patients' compliance with treatment regimens and the extent to which they would become involved and participate in their own treatment process.

Research Question Two

Does self-efficacy of asthma self-management and asthma self-management knowledge predict reading grades, school attendance, and the number of visits to the school nurse?

Out of all the criterion variables, the SMS and AMES were more likely to predict reading grades ($R^2 = .119$) than number of days absent ($R^2 = .006$) and number of visits to the school nurse ($R^2 = .007$). Again, due to the fact that students were not randomly selected, one would be cautious in generalizing these findings to children in the same sample. It is well documented that children with asthma are confronted not only by medical problems but also by a high absentee rate and poor academic performance (Freudenberg, Feldman, Clark, Millman, Valle, & Wasilewski, 1980; Hannaway, 2002; Lynch, Lewis, & Murphy, 1992; MacLean, Perrin, Gortmaker, & Pierre, 1992; Theis, 1999). Asthma literature suggests that children absent from school, due to asthma are usually absent more frequently, but only for a brief period of time, which can be more harmful academically then the occasional long absence (Richards, 1986).

The research regarding asthma education has proven to be fairly inconsistent or non-existent. For example, although Parcel, Nader, and Tierman (1980) found that children attending their school-based asthma management program "Teaching Myself about Asthma" showed an increase in knowledge about asthma and a feeling of control over their asthma, they collected no data on school attendance or performance. Overall, the literature suggests that there are some benefits to children receiving asthma education

programs, such as Open Airways, but the effects are small, inconsistent, or again, non-existent. (Young, Foster, Parkin, Reisman, Maclusky, Gold, et al., 2001). Young, Foster, Parkin, Reisman, MacLusky, Gold et al. (2001) found that children with asthma who were given an asthma educational intervention showed no consistent improvement in their attendance. Similarly, Clark, Feldman, Evans, Wasilewski, and Levison (1984) found that although the number of absences decreased for the experimental group in their study, there was no statistical significance between the number of days the experimental group was absent and the number of days the control group was absent. However, Evans, Clark, Feldman, Rips, Kaplan, Levison, et al. (1987b) found that children who completed their "Open Airways" program showed an increase in the number of actions they took to manage their asthma, an increase in school performance, and an increase in feelings of self-efficacy. One possible explanation for these inconsistencies could be based on a subject's asthma self-efficacy at the onset of the research. Carey & Carey (1993) found that smokers who successful quit smoking on their own had a stronger sense of efficacy at the outset than the relapsers and continuous smokers.

The results of this research analysis showed to have the same inconsistencies. Although there was minimal evidence ($R^2 = .119$) showing that the student outcome reading scores could be used as a predictor, one should be cautious to generalize this finding to other potential samples or a greater population as they may not be representative of other children with asthma. It should be noted that the researcher did not take into account that there could have been an interaction that we know have affects on academic achievement such as prior achievement, social economic status, and evidence of a cognitive disability. There was no variance accounted for in the student

outcome measures of number of days absent and number of visits to the school nurse, which makes these variables poor predictors of self-efficacy of asthma self-management and asthma self-management knowledge.

However, the findings in this research are consistent with the findings of Bandura (1997) in that one's self-management knowledge is related to one's self-efficacy. Bandura also states that knowledge creates the precondition for change, and although one would be hesitant to generalize to other samples that self-efficacy of asthma and asthma self-management knowledge can predict reading grades, one can say that children who adhere to an asthma self-management program are more likely to have higher reading grades.

Limits of the Study

There are several limitations associated with this study. Although the researcher developed the AMES and the SMS in alignment with the Open Airways program, it should be noted that children in this research study received no asthma education about the effects that they may encounter as a result of having asthma. Second, severity of the children's asthma was not taken into account. Children with more severe asthma are going to be on more medications and would more than likely be absent more and make more visits to the school nurse. Third, the researcher did not take into account grade level variation. Although an A is 100% to 90%, an A in Kindergarten is not the same as an A in 5th grade. Fourth, in examining academic achievement, the researcher did not take into account prior achievement, social economic status, or evidence of a cognitive disability; all of which are known to have affects of academic achievement.

Recommendations for Practice

The researcher offers the following recommendations for practice.

1. If knowledge is related to self-efficacy and behavior is related to self-management, then children should be provided knowledge about these issues. However, no data from this study relate to self-efficacy and student outcomes.
2. It is recommended that community health clinics for indigent populations be included when conducting research. Including such clinics could provided knowledge to the patients and provides the researcher a population with whom to conduct research.

Recommendations for Further Research

The researcher offers the following recommendations for future research on the study of self-efficacy and the self-management of asthma in a school setting.

1. In future research studies, participants should be recruited through a medical facility or have the endorsement of a medical doctor. One of the reasons for the limited number of participants in the study may be due to not having the endorsement of a medical doctor or facility. In past asthma research, participants were first gathered from outpatient medical facilities.
2. Written information about asthma for parents is provided and children are encouraged to complete take-home assignments with their parents. To enhance the understanding of parent's asthma self-management knowledge, it is recommended that follow-up interviews with the

participating parents be conducted. Comparing parental asthma self-management knowledge and the student's asthma self-management knowledge may help develop a better understanding of the impact that parental teachings have on children. Children have various resources that influence their learning including their school, friends, and parents. It was apparent from the information gathered from the demographic survey completed by parents that their asthma self-management knowledge varied. Some asthma programs contain a direct teaching component for parents. Open Airways for Schools recognizes that many parents cannot attend parent-child programs.

3. It is recommended that future studies examine school nurses' knowledge and attitudes about asthma self-efficacy and asthma self-management.
4. It is recommended that the written language of the SMS and AMES be reduced to a lower reading level to increase the comprehension of children aged 5-11years.
5. It is recommended that future studies collaborate with the school nurses to follow-up with non-respondents to increase sample size.
6. It is recommended that future studies be comprised of participants that reflect national statistics. Asthma affects the African- American and Hispanic cultures more than the Caucasian culture; however, the majority (80%) of the participants in this study were Caucasian.

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APPENDIX A

ASTHMA STUDENT SELF-MANAGEMENT KNOWLEDGE IN A SCHOOL SETTING SURVEY (SMS)

ASTHMA STUDENT SELF-MANAGEMENT KNOWLEDGE IN A SCHOOL SETTING SURVEY (SMS)

1. Do you know where in your body you get asthma? YES NO
If YES, where?

_____
_____
_____

2. Do you know what happens to your lungs during an attack? YES NO
If YES, what?

_____
_____
_____

3. Do you know when you are having an asthma attack? YES NO
If YES, how?

_____
_____
_____

4. Do you know what your asthma triggers are? YES NO
If YES, what are they?

_____
_____
_____

5. Do you know what your asthma warning symptoms are? YES NO
If YES, what are they?

_____
_____
_____

6. Do you know what deep belly breathing is? YES NO
If YES, what is it?

_____
_____
_____

7. Do you know whom to tell about your warning symptoms? YES NO
If YES, who?

_____
_____
_____

8. Do you know how to correctly tell how bad your asthma is using the traffic light?
If YES, explain? YES NO

_____
_____
_____

9. Do you know how to use a peak flow meter? YES NO
If YES, how?

_____
_____
_____

10. Do you know why you take asthma medicine? YES NO
If YES, why?

_____
_____
_____

11. Do you know what your asthma medicine does? YES NO
If YES, what?

_____
_____
_____

12. Do you know when to take your asthma medicine? YES NO
If YES, when?

_____
_____
_____

13. Do you know how much asthma medicine to take? YES NO
If YES, how much?

_____
_____
_____

14. Do you know how often to take your asthma medicine? YES NO
If YES, how often?

_____
_____
_____

15. Do you know what type of asthma medicine you take? YES NO
If YES, what type?

_____
_____
_____

16. Do you know the name of your asthma medicine? YES NO
If YES, what is it?

_____
_____
_____

17. Do you know how to take you asthma medicine? YES NO
If YES, how?

_____
_____
_____

18. Do you know how long to wait to see if your asthma medicine is working?
If YES, how long? YES NO

_____
_____
_____

19. Do you know when to do deep coughs? YES NO
If YES, when

_____
_____
_____

20. Do you know what to do if something happens to you? YES NO
If YES, what?

_____
_____
_____

21. Do you know when to get help? YES NO
If YES, when?

_____
_____
_____

22. Do you know when to stay home from school because of asthma? YES NO
If YES, when?

_____
_____
_____

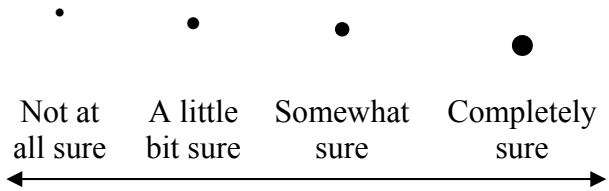
APPENDIX B

ASTHMA SELF-EFFICACY OF SELF-MANAGEMENT OF ASTHMA SURVEY (AMES)

ASTHMA SELF-EFFICACY OF SELF-MANAGEMENT OF ASTHMA SURVEY (AMES)

		Not at all sure	A little bit sure	Somewhat sure	Completely sure
1.	How sure are you that you know where in your body you get asthma?	1	2	3	4
2.	How sure are you that you know what happens to your lungs during an asthma attack?	1	2	3	4
3.	How sure are you that you know if you are having an asthma attack?	1	2	3	4
4.	How sure are you that you know your asthma triggers (causes) are?	1	2	3	4
5.	How sure are you that you know your asthma warning symptoms are?	1	2	3	4
6.	How sure are you that you know how to do deep belly breathing correctly?	1	2	3	4
7.	How sure are you that you can tell an adult about your warning symptoms?	1	2	3	4
8.	How sure are you that you can correctly tell an adult how bad your symptoms are using the traffic light?	1	2	3	4
9.	How sure are you that you know *how* to correctly use a peak flow meter?	1	2	3	4

	Not at all sure	A little bit sure	Somewhat sure	Completely sure
10. How sure are you that you know *why* you take asthma medicine?	1	2	3	4
11. How sure are you that you know *what* your asthma medicine does?	1	2	3	4
12. How sure are you that you know when to take your asthma medicine?	1	2	3	4
13. How sure are you that you know the correct amount of asthma medicine to take?	1	2	3	4
14. How sure are you that you know how often to take your asthma medicine?	1	2	3	4
15. How sure are you that you know what type of asthma medicine you take?	1	2	3	4
16. How sure are you that you know the correct name of your asthma medicine?	1	2	3	4
17. How sure are you that you know how to correctly take your asthma medicine?	1	2	3	4
18. How sure are you that you know how long to wait to see if your asthma medicine is working?	1	2	3	4



19. How sure are you that you know when to do deep coughs?	1	2	3	4
20. How sure are you that you know what to do if something happens to you?	1	2	3	4
21. How sure are you that you know the signs that you need help?	1	2	3	4
22. How sure are you that you know when to stay home from school due to asthma?	1	2	3	4

APPENDIX C

STUDENT/PARENT DEMOGRAPHIC SURVEY

Student/Parent Demographic Survey

Child's Name: _____

Parent(s) Name: _____

Child's Date of Birth: _____

Child's Age *(Circle number of your answer)*

1 5-6
2 7-10
3 11-13

Child's Grade Level *(Circle number of your answer)*

1 1st GRADE
2 2nd GRADE
3 3rd GRADE
4 4th GRADE
5 5th GRADE
6 Kindergarten

School District: _____ **School:** _____

Child's Sex *(Circle number of your answer)*

1 MALE
2 FEMALE

Race *(Circle number of your answer)*

1 WHITE
2 NATIVE AMERICAN
3 BLACK
4 HISPANIC
5 OTHER: _____

Does family member, besides the child mentioned above, have or has had asthma? *(Circle all that apply)*

1 MOM
2 DAD
3 BROTHER
4 SISTER
5 GRANDMA
6 GRANDPA

At what age was your child diagnosed with asthma? *(Circle number of your answer)*

1 BIRTH-1 YEAR OLD
2 1-5 YEARS OLD
3 5- 10 YEARS OLD
4 11-13 YEARS OLD

When your child was diagnosed with asthma what type of information were you given? *(Circle all that apply)*

1 NO INFORMATION GIVEN
2 INFORMATION ON ASTHMA, THE DISEASE
3 INFORMATIONON ASTHMA TRIGGERS
4 INFORMATION ON ASTHMA SYMPTOMS
5 INFORMATION ON SPECIFIC ASTHMA MEDICATIONS
6 INFORMATION ON TAKING YOUR ASTHMA MEDICATION
7 INFORMATION ON PEAK FLOW METERS
8 INFORMATION ON ASTHMA INHALERS
9 INFORMATION ON ASTHMA SELF-MANAGEMENT

How many different ASTHMA medicines in your child on? *(Circle number of answer)*

1 ZERO
2 ONE
2 TWO
3 THREE
4 FOUR
5 FIVE

Does your child self manage his/her asthma? *(Circle number of answer)*

1 NO
2 YES

What is your child's warning signs for an asthma attack? *(Circle all that apply)*

1 COUGHING
2 WHEEZING
3 STUFFY NOSE
4 THROAT BECOMES ITCHY
5 EYES WATER
6 OUT OF BREATH
7 CHEST FEELS TIGHT
8 CLEARING OF THROAT

How many visits has your child had to the school nurse for asthma related problems within the last six weeks? *(Circle number of answer)*

1 ZERO
2 1-2
3 3-4
4 5-6
5 7-8
6 9-10
7 MORE THAN 10
8 DAILY

How many times has your child been absent for asthma related problems within the last six weeks? *(Circle number of answer)*

1 NONE
2 ONE TIME
3 TWO TIMES
4 THREE TIMES
5 FOUR TIMES
6 FIVE TIMES
7 MORE THAN FIVE TIMES

How often does your child use a peak flow meter? *(Circle number of answer)*

1 DAILY
2 TWICE A WEEK
3 ONCE A WEEK
4 ONCE A MONTH
5 TWICE A YEAR
6 YEARLY
7 NEVER

APPENDIX D

CONSENT AND ASSENT FORMS

Parental Consent Form

1) **Purpose of Study**

The overall purpose of this research study is to examine the relationship of how confident children are regarding their asthma self-management and their asthma self-management knowledge. This study will be used as a dissertation.

There will be approximately 200 children between the ages of 7 & 12 who have been diagnosed with asthma helping out with this study. I will fill out the demographics survey and return along with the assent and consent forms. Once the researcher has received this information, the researcher will call me to schedule a time for a 20-30 minute interview with my child. At the interview my child will be asked to answer questions about asthma and asthma the way he/she handles their asthma. None of this will be uncomfortable or hurt.

Once the interview is complete the researcher will examine my child's grades, achievement scores (IOWA or TAAS), number of days absent, and the number of times my child visited the school nurse for asthma related problems. This information will be compared in relation to his/her confidence about their asthma self-management and their asthma self-management knowledge. Any information given to the investigator is completely confidential and is used solely for research purposes.

2) **Benefits and Compensation-**

Neither my child nor I will be paid for participation. A presentation of the research findings will be offered for parents and their children by the researcher, but I will not find out about my child's individual responses or results.

3) Voluntary Nature of Participation-

I recognize that I am volunteering my child for this study and that I, or my child may choose to quit at any time, for any reason, without affecting his/her grades or school standing or anything else. That is, I may decide at any time to withdraw from the study by contacting the researcher or research advisors located on the bottom of this consent form.

4) **Confidentiality-**

All results will remain confidential by assigning participants and surveys with a code. All information on identification numbers and associated student names will be held in a locked file cabinet accessible only by the researcher. In addition, all reports will present compiled information and as a consequence, individual identities of participants will not be possible from research reports. Should I choose not to participate my name and my child's name will remain anonymous. If child abuse is detected, it must be reported to the proper authorities.

I have read this page of information _____ (initials)
Date _____

5) "I understand that this research study has been reviewed and approved by the Institutional Review Board-Human Subjects in Research, Texas A&M University. For research-related problems or questions regarding subjects' rights, I can contact the Institutional Review Board through Dr. Michael W. Buckley, Director of Compliance and Administration, Office of Vice President for Research at (979) 845-4067 (email: mwbuckley@tamu.edu)."

I have read and understand the explanation provided to me. I have had all my questions answered to my satisfaction, and I voluntarily agree to participate in this study. I will fill out the demographic survey and return it along with this form.

I have been given a copy of this consent form

_____ _____

Parent's Name (Print) **Parent's Signature**

_____
Date

_____
Name of Child (Print)

_____ _____
Principal Investigator Date
Or Authorized Representative

Child Assent Form

1) Purpose of the Study-

This research project is to learn about what children believe they know about their asthma, how they believe they take care of their asthma and how it affects them in school.

There will be about 200 children between the ages of 7 and 12 with asthma helping out with this study. The researcher will call me to set up a time for a 20-30 minute talk about my asthma. During the talk I will be asked to answer questions about asthma and about the way I deal with my asthma. None of this will be uncomfortable or hurt. I will be asked questions such as "Do you know where in your body you get asthma?" I may refuse to answer any question that makes me feel uncomfortable and no one will be angry with me.

Once the talk is over the researcher will look at my grades, test scores (IOWA or TAAS), number of days absent, and the number of times I visited the school nurse for asthma problems.

2) **Benefits and Compensation-**

I will not be paid for participating, but this research project will help the researcher better understand asthma in children.

3) Voluntary Nature of Participation-

I know that I am volunteering for this study and that I may quit at any time, for any reason, and no one will be angry with me nor will quitting affect my grades or school standing.

4) **Confidentiality-**

All results will remain secure, this means my answers will be combined with other children and there will be no report where people can recognize me or my answers. Information on identification numbers will be locked in a file cabinet that will be available only by the researcher.

5) "I understand that this research study has been reviewed and approved by the Institutional Review Board-Human Subjects in Research, Texas A&M University. For research-related problems or questions regarding subjects' rights, I can contact the Institutional Review Board through Dr. Michael W. Buckley, Director of Compliance and Administration, Office of Vice President for Research at (979) 845-4067 (email: mwbuckley@tamu.edu)."

I have read and understand the explanation provided to me. I have had all my questions answered to my satisfaction, and I voluntarily agree to participate in this study.

I have been given a copy of this consent form.

_____ _____

Child' Name (Print) **Child's Signature**

_____

Date

APPENDIX E

STUDENT OUTCOME GRIDS

Child's Name	School Attend	Reading	Number of Days Absent in 2nd Nine Weeks

Child's	Number of Visits to Nurse for Asthma During the 2nd Nine Weeks	
Name	Number of Visits for Asthma Related Problem	Comments

Child's	Standardized Test Scores					
Name	TAKS Reading	TAKS Math	TAKS Writing	COGAT	ITBS	BOEHM

VITA

Name: Laura Steed McCorkle
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EDUCATION

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